Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

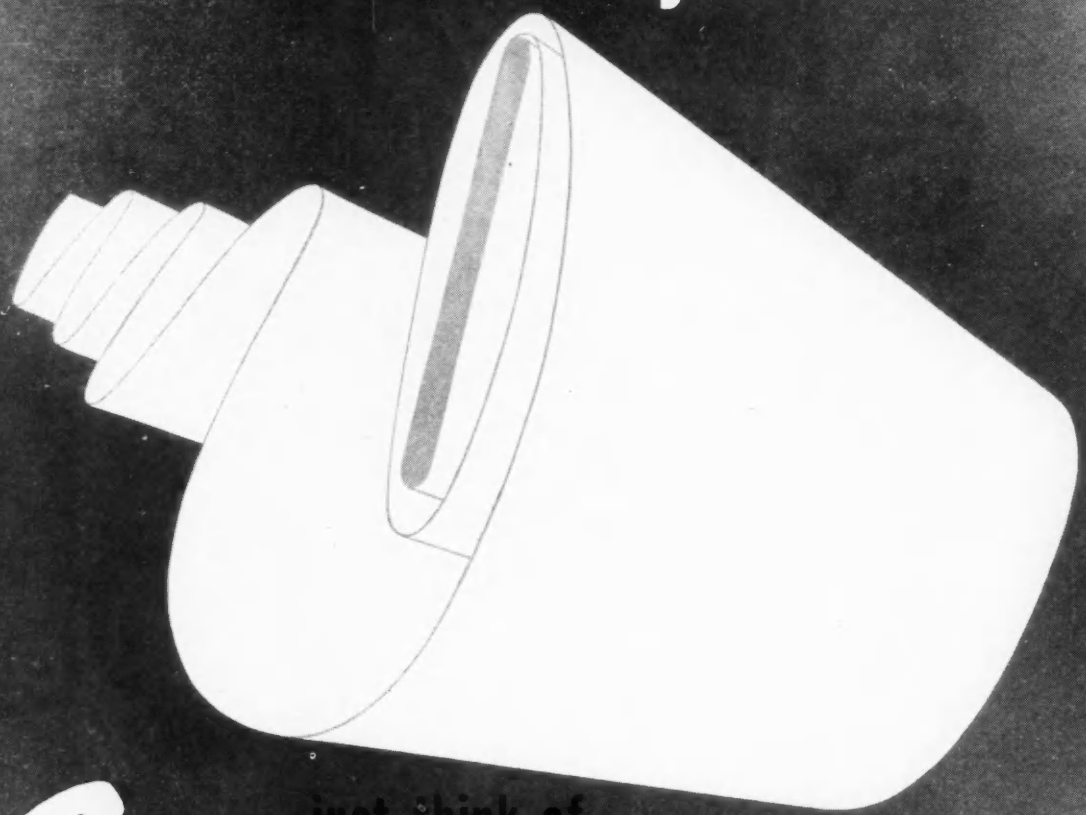
MARCH 22, 1948
VOLUME 37, No. 6

AMERICAN DYESTUFF REPORTER

DuPont colors for wool
With these products, Du Pont supplies a line of wool dyes to meet practically all requirements, offering the wool dyer a wide range of colors and shades in varying brilliance and fastness. Ask our Technical Staff about your specific dyeing problem. They're always ready to help in the selection of colors and dyeing method most suitable for your purpose. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.
Pontacyl* Colors
Pontachrome* Colors
Chromacyl* Colors
Du Pont Milling Colors
Du Pont Alizarine Colors
Du Pont Anthraquinone Colors
*Reg. U. S. Pat. Off.
Du Pont Dyestuffs
DUPONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

whenever you think of nylon



just think of Supernylite

fast dyes for nylon

light fastness medium shades, 40 to 300 hours

wash fastness 140° F. to 180° F.

Dye Fast Unions on Nylon and Wool.
Dye Fast Unions on Nylon and Rayon or Cotton in combination with SUPER-LITEFAST direct dyes.

Extremely level dying in all percentages, for pastels and heavy shades on piece goods, yarns, etc.

Chemical Company, Inc.

READING · PA.

AMANTHRENE* VAT COLORS
provide the answer to the demand for
better color fastness in textiles.

Amanthrene

OLIVE GREEN B

in paste or
double powder form

Classified 1-A all through the war, this veteran vat color, now released for civilian use, offers a high degree of fastness to light, washing, chlorine and perspiration.

A pleasing self shade — a base color for Forest and Bottle Greens and a contributing item for Olive Drab. Printability excellent — well suited for use on cotton and rayon by every manner of vat application.

Another of the Amanthrene range of superior vat colors. For detailed information on the whole range available, as well as data regarding your own particular requirements, consult our nearest branch. A.A.P. technicians are always happy to be of service.

AMERICAN ANILINE PRODUCTS, INC., 50 Union Square, New York, N. Y. • ***Plant:*** Lock Haven, Pa.
Branches: Boston, Mass. • Providence, R. I. • Philadelphia, Pa. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Chattanooga, Tenn. • **Dominion Anilines & Chemicals Ltd.** • Toronto, Canada • Montreal, Canada

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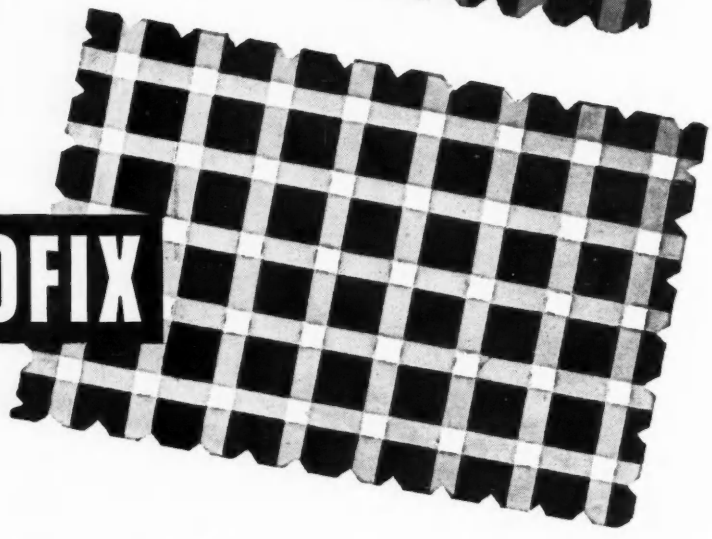
STOP

COLOR BLEEDING

with *CULOFIX



Preserve crisp detail and contrast of prints by using time-tested Culofix as an after treatment.

Kill bleeding troubles no matter where they occur—in the finishing bath—batching up after dyeing—in cross dyeing, etc.

Improve water fastness of direct colors and impart a very desirable soft, full finish at the same time, thus eliminating an extra finishing operation. (Where no softening action is needed, Culofix L should be used.)

If fastness to water or prevention of color migration is essential to your direct color dyeings, write for Technical Service Bulletin #204-106.1. Our technical staff is at your service without obligation.

*REG. U.S. PAT. OFF.

Arkansas Co. INC.

Manufacturers of Industrial Chemicals for Over 40 Years

NEWARK, NEW JERSEY

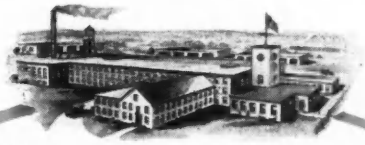
Some Things Just Don't Penetrate

BUT . . .

ATCOPEN 2-T DOES EVERY TIME!

For Wetting Out and Rewetting On All Types of Fabrics

ATCOpenetrate with ATCOPEN 2-T



Ask for product sample and full technical information *today!*

Atlantic Chemical Co., Inc.

MAIN PLANT: CENTREDALE, RHODE ISLAND
BRANCH OFFICE: PATERSON, NEW JERSEY

Use ATCO Products

American Dyestuff Reporter, Vol. 37, No. 6, March 22, 1948. Published every other Monday. Copyright, 1948, by Howes Publishing Co., Inc., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00; Foreign, $10.00. Entered as second-class matter. Nov. 6, 1919, at the New York, N. Y. Post Office, under the act of March 3, 1879.

Ny-dull gives clear even Dullness to Mono-Filament Hose

NYDULL • NYDULL • NYDULL •

PERMA - PAR R

An improved cation action finish

RESISTANT TO WASHING & DRY CLEANING

REFINED PRODUCTS CORPORATION

Lyndhurst • New Jersey

• **Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent**

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I.
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Cal Company, 82 Wall St., New York City.

Vanesta

THE STARCH STABILIZER

For Textile Sizing & Printing

Holds Size Over Weekends

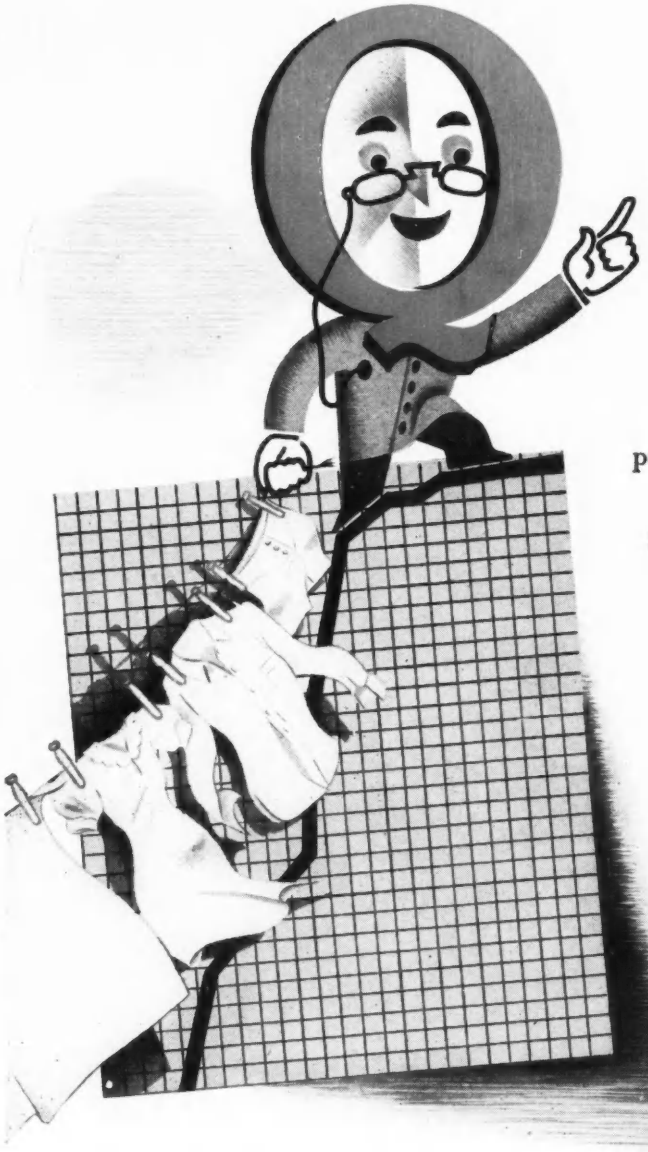
Maintains Fluidity

Stops Gelling

Sample on request

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.



CLEANLINESS REACHES THE TOP

. . . when QUADRAFOS* gives washing a lift

Your scour hits new heights of cleaning power when QUADRAFOS helps you get the most out of the least soap and alkali. Softening even the hardest water right down to the zero mark without the slightest trace of precipitation, QUADRAFOS is clearly water's most efficient partner. That's why you'll find nothing like the way QUADRAFOS loosens the grip of grease and soil, breaks them up into tiny particles, prevents them from re-gathering on material or equipment. Write for complete information about the many ways QUADRAFOS can help you "clean up" in textile wet processing.

softens water without precipitation...deflocculates ...redissolves precipitates...promotes free rinsing

ONLY WITH
QUADRAFOS
CAN WATER
DO SO MUCH, SO WELL

*U. S. Reg. Trade-Mark for Sodium Tetraphosphate made by Rumford

RUMFORD CHEMICAL WORKS
Technical Service Department
20 Newman Avenue
Rumford 16, Rhode Island

Please send me further information about the use of QUADRAFOS in textile wet processing. I'm particularly interested in:

- ☐ Raw wool scouring
- ☐ Piece goods scouring
- ☐ Kier boiling
- ☐ Reducing bleach requirements
- ☐ Brighter, more uniform dyeing
- ☐ Viscosity control of printing pastes
- ☐ .....

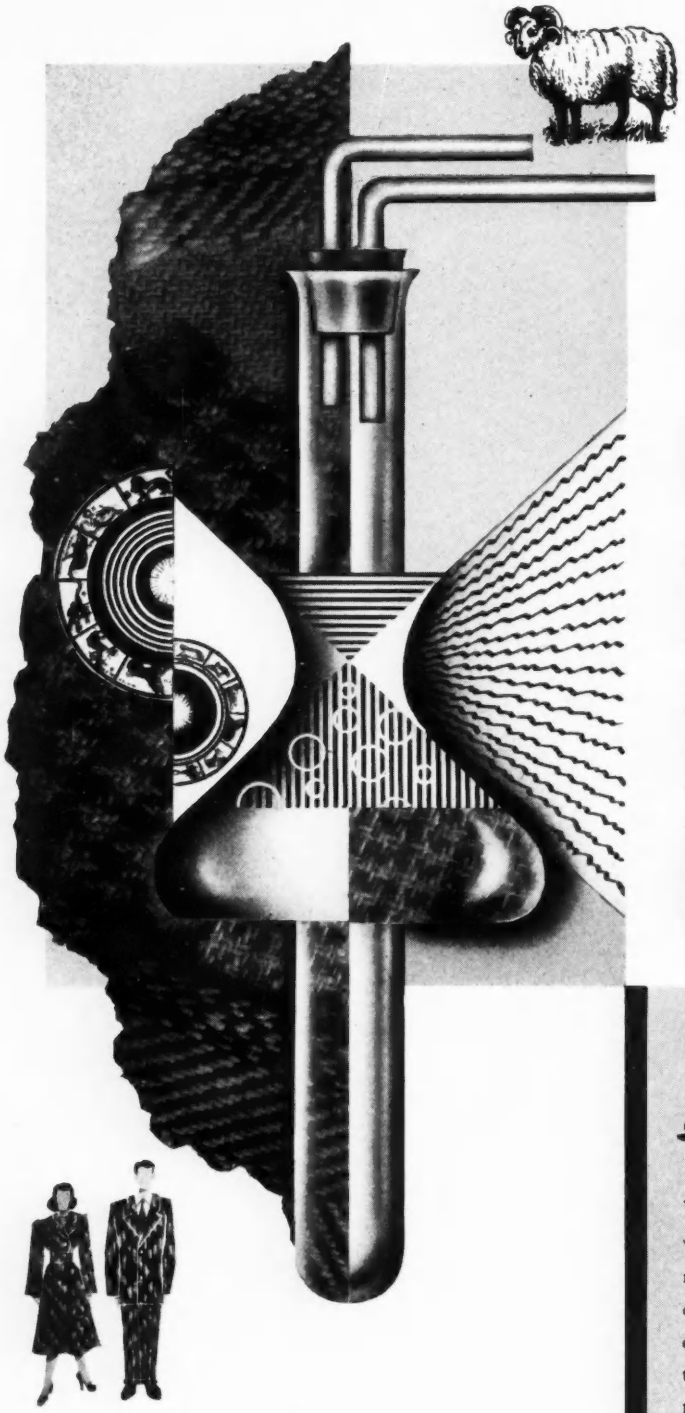
Name .....

Firm .....

Address .....

.....

City ..... *Zone* ..... *State* .....



a new fabric is born

BUT...

How Will it Scour?

With a yard of your fabric in the grease we are in a position through our research laboratory to give you a complete detergency analysis. Join our many customers who are enjoying this service that offers you the most economical procedure for scouring your fabrics.

A Watson-Park representative will be glad to discuss your problems with you, or if you wish, just mail us the material you desire analyzed.

WATSON-PARK CO.
261 FRANKLIN ST. BOSTON, MASS.
FACTORY · LOWELL JUNCTION · MASS.

Eternalure

Resin Finish for Nylons that Lasts *for the Life of the Hose!*

ETERNALURE resin finish tightens and clarifies the stitch on any denier hose without sacrifice of length. It not only adds to hosiery "eye appeal," but provides notable snag resistance. Hose have good body without undesirable stiffness. The finish lasts for the life of the hose.

From the viewpoint of the finisher, Eternalure has many processing advantages:

- On sheer hose Eternalure gives a body which insures easy handling after boarding.
- Treated hose can be handled with a minimum of pull threads.
- Adequate dulling is provided without danger of chalky deposits.
- It is easy to use without changes in equipment or operations.
- Hose do not stick to and deposits do not build up on forms.

Eternalure has no primary irritating action, and no sensitizing effects on human skin.

Ask for Demonstration

ONYX OIL & CHEMICAL COMPANY

JERSEY CITY 2, N. J.

CHICAGO • PROVIDENCE • CHARLOTTE • ATLANTA • LOS ANGELES

In Canada: Onyx Oil & Chemical Co., Ltd., Montreal, Toronto, St. Johns, Que.
For Export: Onyx International, Jersey City 2, N. J.

onyx **RESIN FINISHES FOR HOSIERY**

What makes it Sell ?

What puts the eye-appeal and sales-appeal in synthetic fabrics? Is it just the design? You know that's only half the story. Quite as important is the fabric finish—the softness, the pleasing hand, the draping qualities.

Back of every good finish there's good processing — the efficient type of processing you can count on with Olate.

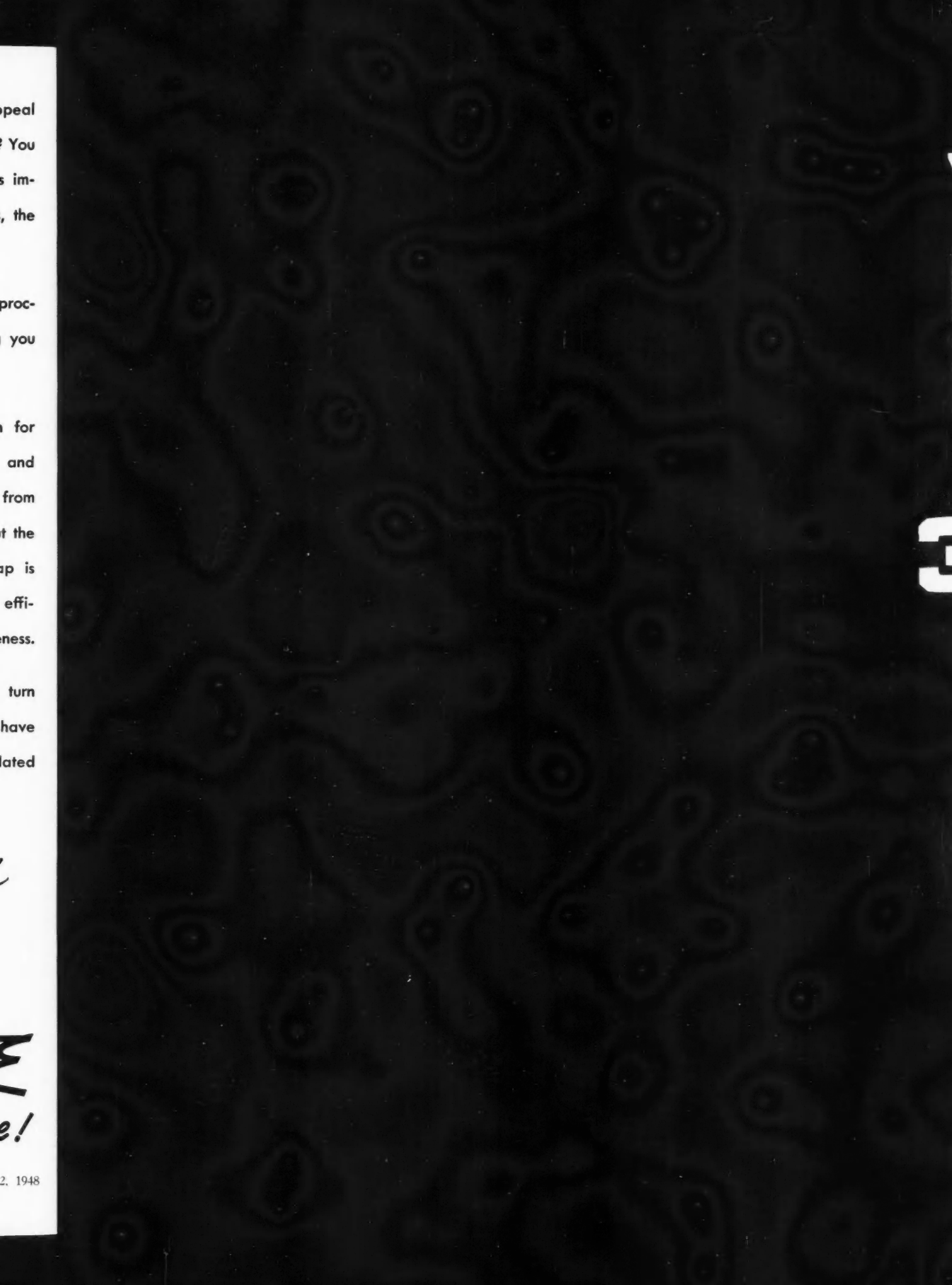
Olate has a well established reputation for quick solubility, exceptional detergency, and good lubricating properties. Olate rinses from fabrics rapidly and thoroughly. Throughout the industry this pure, neutral, low titer soap is widely used because of its efficiency, economy, and gentleness.

Olate can help *your* plant turn out synthetic fabrics which have the eye-appeal so closely related to sales-appeal. Try it.

Procter & Gamble

Olate

safe and efficient for every textile soap usage!



dyestuffs for pure silk

dyeing

application prints

discharge prints

selected dyestuffs with good fastness properties in a wide range of colors.

GENERAL DYESTUFF CORPORATION

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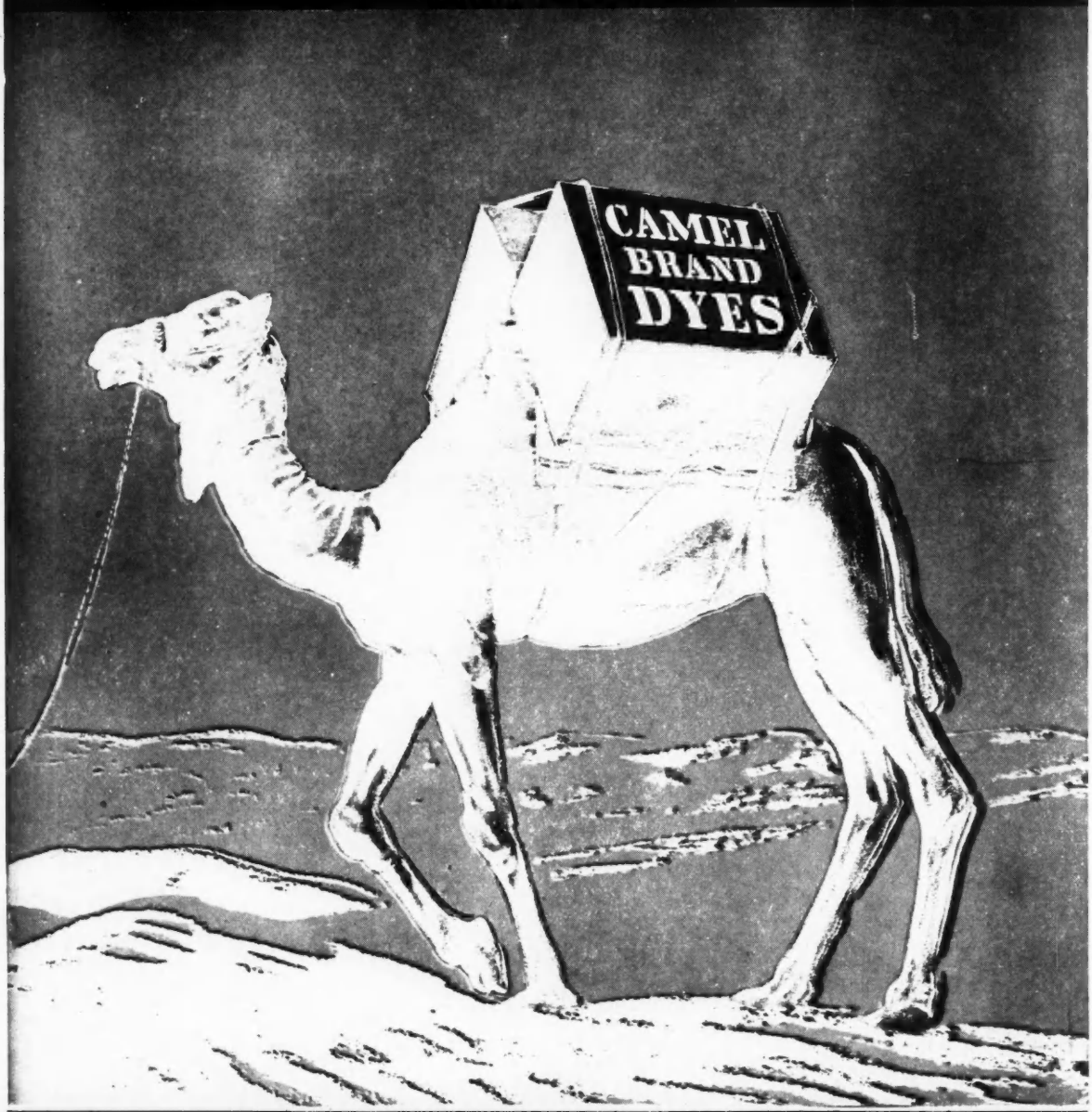
GDC

QUALITY DYESTUFFS

SINCE 1878



JOHN CAMPBELL & COMPANY, Inc.

75 HUDSON STREET • NEW YORK CITY

TELEPHONE: BArclay 7-6228-6229

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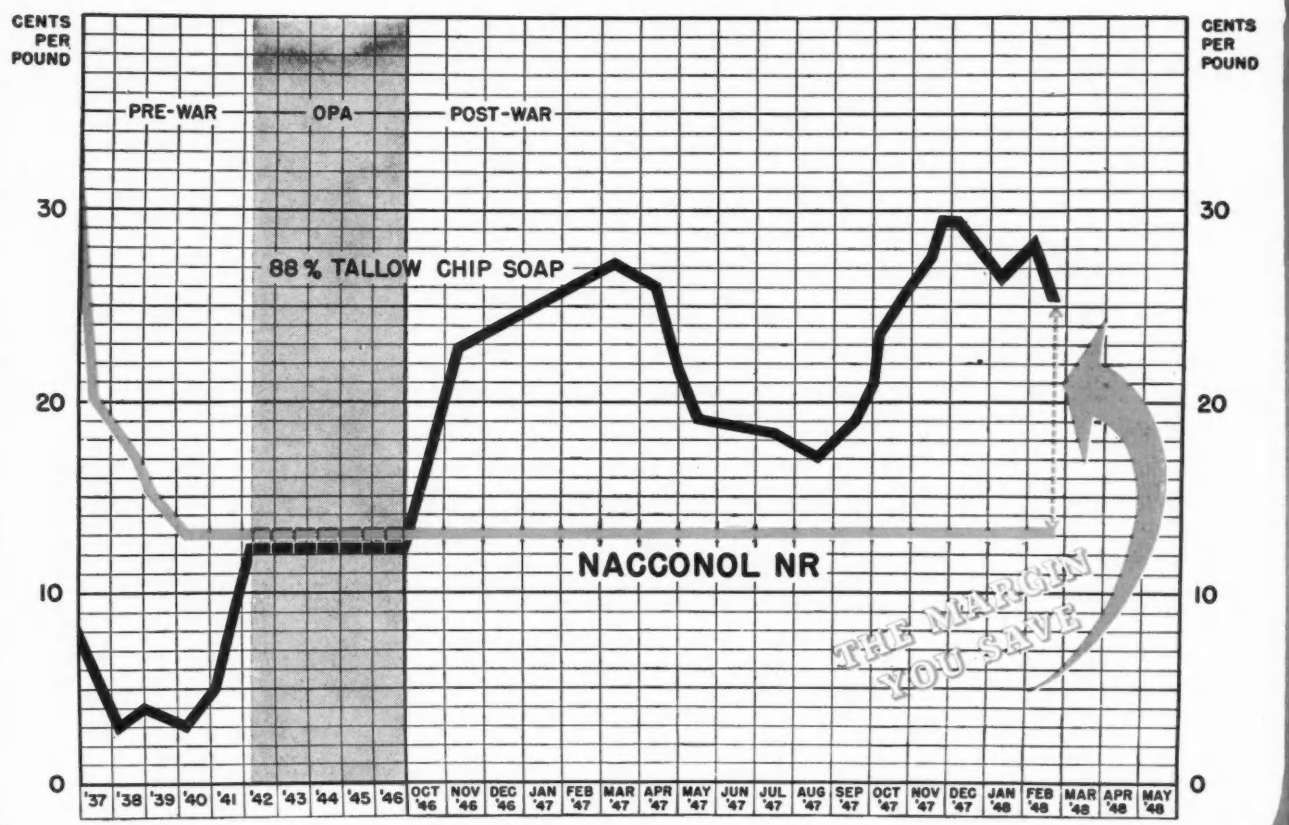
BRANCH OFFICES AND WAREHOUSES:

BOSTON EAST CLEVELAND, OHIO ATLANTA, GA.

Pictures Speak Louder Than Words

COST COMPARISON - NACCONOL NR vs SOAP


CENTS PER POUND
PRE-WAR
OPA
POST-WAR
30
20
10
0
88% TALLOW CHIP SOAP
NACCONOL NR
THE MARGIN YOU SAVE
'37 '38 '39 '40 '41 '42 '43 '44 '45 '46 OCT '46 NOV '46 DEC '46 JAN '47 FEB '47 MAR '47 APR '47 MAY '47 JUN '47 JUL '47 AUG '47 SEP '47 OCT '47 NOV '47 DEC '47 JAN '48 FEB '48 MAR '48 APR '48 MAY '48

Adopt **NACCONOL NR**
and cut your soap costs

National Aniline DIVISION - ALLIED CHEMICAL & DYE CORPORATION

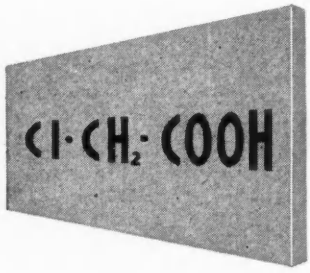
40 RECTOR ST., NEW YORK 6, N.Y. - BOSTON - PROVIDENCE - PHILADELPHIA - CHICAGO - SAN FRANCISCO - PORTLAND, ORE. GREENSBORO - CHARLOTTE - ATLANTA - NEW ORLEANS - CHATTANOOGA - TORONTO

Its Readily Substituted Chlorine makes

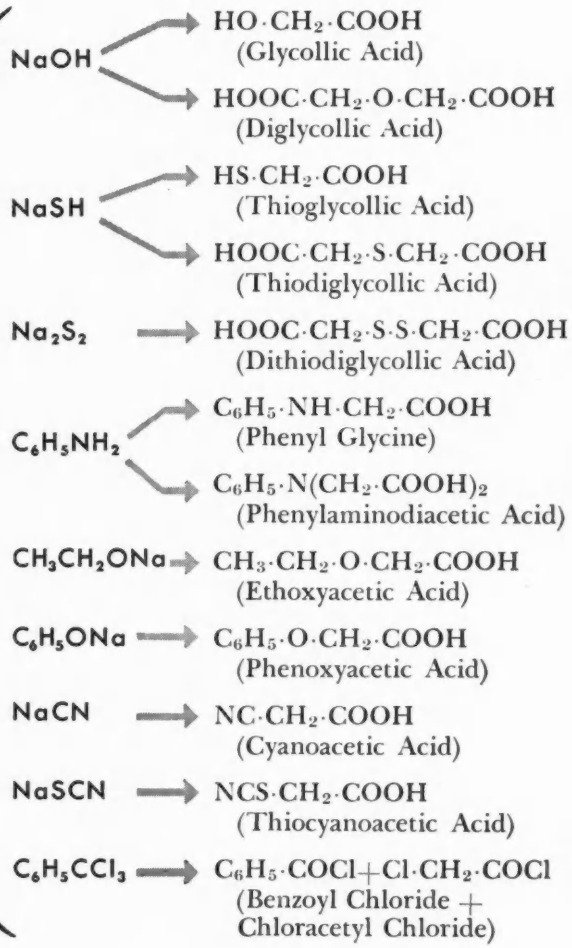
MONOCHLORACETIC ACID

an important Intermediate

This versatile chemical is now being produced by Hooker as a technical grade material. Its ability to react readily with many different reagents is indicated by a few of the typical reactions shown.



Hooker Monochloracetic Acid is a fine, white, free flowing flake material with a sweetish odor. The technical grade has a minimum monochloracetic acid content of 98%, a maximum of 2% dichloracetic acid, and a melting point of 60° C min.



Additional physical and chemical data are given in Technical Data Sheet 752. Literature and samples are available when requested on your company letterhead.

HOOKER ELECTROCHEMICAL COMPANY

2 Forty-Seventh St., Niagara Falls, N. Y.
New York, N. Y. Wilmington, Calif. Tacoma, Wash.

HOOKER CHEMICALS

Caustic Soda Muriatic Acid Sodium Sulfide Paradichlorbenzene Chlorine Sodium Sulfhydrate

BETTER

No matter what type of dyeing machine you need Van Vlaanderen makes it.

•

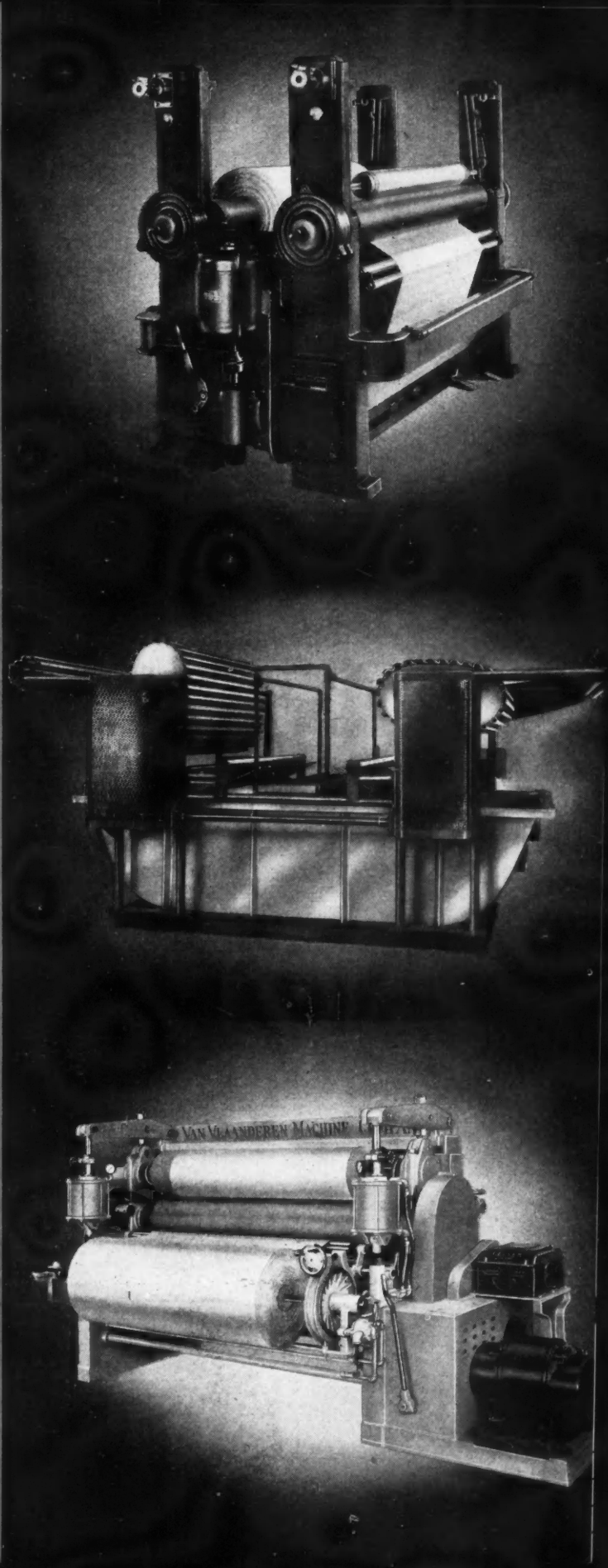
Better production and better quality of finished fabric are synonymous with the name

VAN VLAANDEREN

MACHINE COMPANY
370 STRAIGHT STREET
PATERSON 3, NEW JERSEY

•

World's largest manufacturer of machinery for processing modern fabrics



FOR YOUR INFORMATION

8 + 3 = RESLOOM

8 PERFORMANCE QUALITIES

3 EXCLUSIVE PLANT ADVANTAGES

Millmen and finishers as well as the manufacturer and ultimate consumer profit by the use of Resloom in finishes for cotton, wool and rayons. Unlike other materials, Resloom offers:

Stability in storage . . . Resloom can be stored at room temperatures for an indefinite period.

Ease of putting into solution . . . no boiling or icing is required with Resloom and solutions have outstanding stability.

Less Resloom required than other finish materials to achieve a given quality.

These three exclusive Resloom features mean production speed-up and a reduction of application costs. These economical advantages are in addition to the following eight sales assets Resloom gives your fabric:

1. **Wrinkle Resistance** . . . unexcelled . . . angle of recovery 100% or more as measured on Monsanto Wrinkle Recovery Meter.
2. **Durability** . . . Resloom doesn't wear away, wash away, dry clean away . . . as durable as the fiber itself.
3. **Shrinkage Control** . . . Often as low as 1% when tested by CCC-T-191a standards.
4. **Stability** . . . a unique fabric builder, upgrades your constructions.
5. **Versatility** . . . effective on all fibers, unequalled on blends.
6. **Compatibility** . . . can be used with other finishing agents.
7. **Strength** . . . no deterioration of fibers.
8. **"Hand"** . . . crisp or soft, any "hand" to meet your preference . . . a range of Resloom makes this possible.

For more Resloom data check C1 on the coupon opposite. *C1*

PRICE REDUCTION FOR MONSANTO'S SYNTHETIC DETERGENT

Increased use of Sted, Monsanto's universal textile detergent and scouring agent has made possible a further reduction in prices.

This reduction warrants an immediate comparison of Sted with any soap or detergent for use in scouring, cleaning or degreasing.

Effective on all types of fibers, Sted has demonstrated its cleansing power in raw wool scouring, kier boiling, desizing, backwashing, hosiery scouring and other washing operations.

Monsanto's all-purpose detergent is stable under all conditions—acid, alkali, hot, cold, hard or soft water.

On a pound for pound basis, Sted has proved to be more effective than other detergents for washing prints, scouring whites, degreasing wool and general cleaning.

For complete technical information on Sted, check C2 on the coupon. *C2*

STED'S LOW PRICES

The following new prices for Sted apply on 100 lb. bags LCL:

F.O.B. Anniston, Ala.	12½c per lb.
F.O.B. Camden, N. J.	13¾c per lb.
F.O.B. Everett, Mass.	14c per lb.

Carload prices from each of these shipping points will be ½¢ a lb. less.

STYMER SAVES ONE HOUR IN DESIZING OPERATION

Mill experience has disclosed that one important advantage of Stymer, Monsanto's new synthetic sizing agent for slashing acetate warps, is the ease with which it is removed from the woven fabric before dyeing and finishing.

A typical report: "Stymer is washed out in 30 minutes; other sizing materials require 1½ hours or more." Stymer is completely removed by a mild scour. No enzymes or strong scouring agents are necessary.

Further proven advantages for Stymer are:

1. Exceptional strength, uniformity and flexibility of the sized warp.
2. Efficiency in slashing—Does not stick to dry cans, separates easily at the lease rods and does not gel in the pipes or size box.
3. Improvements in weaving—reduces shedding, eliminates static, maintains yarn twist and produces more uniform fabric.

Reg. U. S. Pat. Off. Resloom, Stymer, Merlon

For more Stymer information, encircle C4 in the coupon. *C4*

TYPICAL STYMER MILL CASE HISTORY:

WARP DATA	
Fiber	Acetate
Denier	75
Filament	20
Twist	3
Sley	104
Ends	4108
Picks	76
Quality	Bright

SIZE MIX	
Strength	5%
Viscosity	75 cps.
Temperature	150°F.
Formula	42 lbs. Sodium Stymer 1.5 lbs. Defoamer

Remarks: Sodium Stymer added to hot water with vigorous agitation—boiled for 15 minutes. Clear, uniform solution. No difficulty in preparation.

SLASHING DATA	
Type	Johnson 7 can
Speed	30 yds. per min.

SLASHING DATA (Con't.)	
Pickup	app. 70%
Roll Covering	Rubber
Can Temperatures	No. 1. 160°F No. 2. 180°F No. 3. 200°F No. 4. 210°F No. 5. 210°F No. 6. 200°F No. 7. 150°F
Can Coverings	None
Stretch	3%
Appearance	Uniform well sized yarn
Solids Deposited	app. 3.5%

Remarks: Slashing performance was excellent—warps characterized by flexibility and smoothness of handle.

WEAVING DATA	
Speed	150 ppm.
Shedding	None
Weaving Efficiency	95%

Remarks: *Stymer sized warps wove most satisfactorily. Weaving results superior to standards previously attained for this construction.*

MERLONS, MONSANTO'S RESIN DISPERSIONS AVAILABLE FOR IMPROVEMENT OF TEXTILES

Nine Merlons, members of a family of resin dispersed resins, now make possible a wide range of durable finishes for all textile fibers and fabrics.

Varying degrees of softness, fullness and flexibility are obtained by selection or blending of the proper Merlons.

Specific fabric improvements imparted by the Merlons include:

1. Increased wear for work clothes.
2. Luster to sheetings and shirtings.
3. Fullness and crispness to dress goods.
4. Washability and stiffness to curtain materials.

These clear, colorless and odorless resins also have been used successfully as binding agents for pigments, backfilling and fiber bonding.

They are applied from a dilute aqueous bath and require no curing or other after treatment. No special equipment is necessary for application. Once applied, the resin is fixed by merely driving off the moisture by regular drying.

The Merlons are non-irritating, have no affinity for chlorine and are stable over a fairly wide pH range.

For complete details on the Merlons, use the coupon below, marking C3. We can be more helpful if you will state your special interest and type of material. *C3*

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, TEXTILE CHEMICALS DEPT.
Desk ADT3, 140 Federal Street, Boston 10, Mass.

Please send me the following material:

C1 *C2* *C3* *C4*

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

Valuable additions to our line of . . .

Pharmasols*

Brown 2G produces a bright yellow Brown of excellent fastness to washing at a low cost.

Brown R produces a warm Brown of general all-around fastness.

Seal Brown yields a deep Brown at low cost and is of good all-around fastness.

THE THREE NEW BROWNS PRODUCE DESIRABLE TAN SHADES WHEN PRINTED IN REDUCED STRENGTH

THESE NEW BROWNS,
especially Seal Brown and Brown R, are easy to apply and show a very pronounced improvement in their

FASTNESS TO LIGHT

against our former Browns

* REG. U. S. PAT. OFF.

CARBIC COLOR AND CHEMICAL CO., INC.
451-453 Washington Street, New York City

BRANCHES:
PHILADELPHIA
PROVIDENCE HAMILTON, ONT.
CHARLOTTE, N. C.

IMPORTERS OF THE MANUFACTURES OF
DURAND & HUGUENIN S. A.
BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF
PHARMASOLS
PHARMOLS
PHARMACINES

Representative: Los Angeles (Hathaway Allied Products)

AMERICAN

DYESTUFF REPORTER

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March 22, 1948
VOLUME 37 NUMBER 6

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ATLANTIC PETROLEUM CHEMICALS

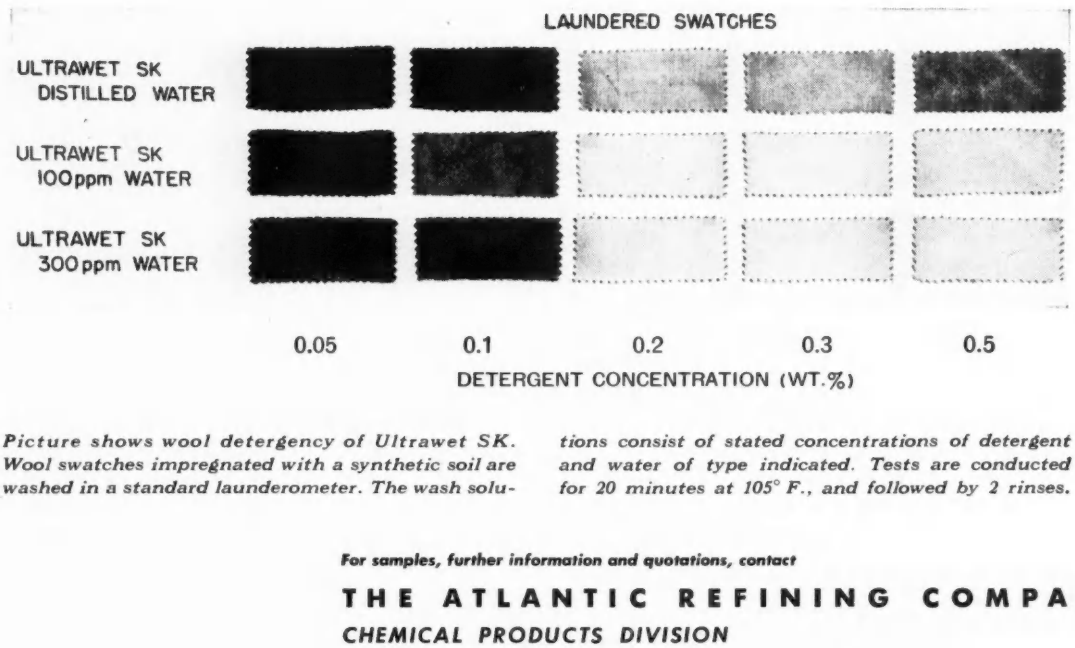
ULTRAWET K's

Is your detergent efficient in all kinds of water?

• If not, it will pay to investigate Atlantic's new Ultrawet SK. The efficiency of this improved detergent actually increases as water becomes harder. As shown below, Ultrawet SK is even more effective in water with a hardness of 300 ppm than in distilled water. *It eliminates the trouble and expense of water softening.*

• Ultrawet SK is one of the new K series of alkyl aryl surface-active agents. This family is the latest development of an organization that has been producing superior detergents and wetting agents for over 10 years. Ultrawet K's are backed by Atlantic's great research facilities. They are now available in quantity in the following types:

Physical form	*Wt. % Active Sulfonate—min.*
Ultrawet K (flakes)	**85**
Ultrawet 30K (liquid)	**25.5**
Ultrawet SK (beads)	**35**



Picture shows wool detergency of Ultrawet SK. Wool swatches impregnated with a synthetic soil are washed in a standard launderometer. The wash solutions consist of stated concentrations of detergent and water of type indicated. Tests are conducted for 20 minutes at 105° F., and followed by 2 rinses.

For samples, further information and quotations, contact

THE ATLANTIC REFINING COMPANY

CHEMICAL PRODUCTS DIVISION

260 South Broad Street, Philadelphia 1, Pa.
Chamber of Commerce Building, Pittsburgh, Pa.
Hospital Trust Building, Providence 1, R. I.

Proceedings of the
American Association of Textile Chemists and Colorists
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MARCH 22, 1948

Technical Program

Augusta, Ga., Convention — October 21-23

General Meeting, Thursday afternoon, October 21, 2:00 P.M.-5:00 P.M.

Three technical papers of general interest will be presented by invited speakers.

Group Meetings, Friday morning, October 22, 9:30 A.M.-12:30 P.M.

Friday afternoon, October 22, 2:30 P.M.-5:30 P.M.

Two group meetings will be held simultaneously. A Cellulosic Fibers Group and a Hosiery Group will meet Friday morning, and a Non-Cellulosic Fibers Group and an Auxiliaries and Testing Group will meet in the afternoon.

A chairman is being selected for each group, who will conduct the meeting and lead the discussion periods. Each session will include one or more papers by invitation on subjects of general interest to the group. In addition, all AATCC members and others engaged in technical activities in the above group classifications are invited to contribute papers. Instructions for contributed papers are given below.

The titles of the group meetings are largely self-explanatory, but the following additional information will be of interest:

Cellulosic Fibers. The problems of cotton, rayon and acetate processing, and of products containing mixtures of these fibers, is to be covered. Papers are desired on new and modified procedures involving preparation, dyeing, finishing and other aspects of the production of these materials. There is a specific interest in papers on new and improved machinery, as well as control instruments and instrumentation.

Hosiery. Much of the hosiery industry is located in the South and it is expected that this meeting will arouse much interest. Papers on all phases of the hosiery industry are invited.

Non-Cellulosic Fibers. This group will be concerned with wool and other protein fibers, nylon and other non-cellulosic synthetics, and all blends of these fibers. The interests are parallel with those listed under the Cellulosic Fibers group.

Auxiliaries and Testing. Any and all aspects of auxiliary materials and test methods are open for consideration at this meeting. The establishment of test methods and equipment is a major function of the AATCC and papers will be welcome on new or modified test procedures and instruments, as well as evaluation of existing methods.

Contributed Papers. The following instructions and regulations are to be followed for contributed papers:

(1) Everyone desiring to contribute a paper should advise Dr. M. A. Dahlen, Room 8518, Nemours Building, Wilmington, Delaware, as soon as possible, giving the title of the proposed paper and the group in which it is to be presented. A statement should be made also as to whether twenty or forty-five minutes is desired for presentation of the paper.

(2) As soon as the number of papers available for each group is known, a selection will be made for each group and the contributors will be advised as to whether their papers have been accepted. It is necessary to make this selection in the near future in order to present a well-balanced program.

(3) An abstract outlining the scope and nature of the paper will be required well in advance of the Convention, the date to be set later.

(4) The paper, as presented orally, may be an abridged version of the written paper.

(5) All papers in complete form ready for submission to the "American Dyestuff Reporter" for publication must be available at the time of the Convention. Earlier submission is desirable. The papers must be in the form prescribed by the Publication Committee of the AATCC (See "Notice to Authors", page P165, March 8, 1948 issue).

(6) Papers must not be primarily of an advertising or promotional character. However, the subject matter may present commercial products, machinery, instruments, processing procedures, etc., of a commercial nature provided they are treated from a technical standpoint.

(7) The Technical Program Committee must be the judge as to which papers are to be accepted, but an effort will be made to include all contributions considered suitable.

Suggested Papers. Many members may have ideas as to desirable topics for papers to be presented at the group meetings. All suggestions as to such papers, and also suggestions as to authors, will be welcome. These too, should be sent promptly to Dr. M. A. Dahlen.

Bylaws for the Northern New England Section

Approval

The Northern New England Section has approved by mail ballot with only one dissenting vote the following Bylaws, prepared by a Committee of Ralph E. Hale, Chairman, Frank J. O'Neil, Delbert E. Ray and Azel W. Mack, and accepted by the Sectional Committee which referred them to the Sectional Membership for approval by vote. Copies of these Bylaws may be obtained by writing to the Northern New England Sectional Secretary, Azel W. Mack, Dexter Chemical Corporation, 581 Boylston Street, Boston 16, Massachusetts.

Article I. Duties of the Chairman

Section A. The Chairman, or in his absence the Vice-Chairman, shall preside at all meetings.

Section B. He shall name standing committees and appoint their Chairmen to have charge of the affairs of the Section. The following Committees and any other Committees which the Sectional Committee shall deem necessary for the proper conduct of the Sectional affairs and business shall be named by the Sectional Chairman. These and any other Committees are subject to report at Sectional Committee meetings except as otherwise called for by the Committee Chairman.*

(1) Speakers Program Committee.
(2) Intersectional Contest Paper Committee.
(3) Nominating Committee.
(4) Membership Committee.
(5) Corporate Membership Committee.
(6) Annual Outing Committee.
(7) Publicity Committee.
(8) Dining Committee.
(9) Chairman's Advisory Committee.
(10) Seating Committee.
(11) Properties Committee.
(12) Bylaws Committee.
(13) Students' Chapter Committee. (Sectional Chairman is to be Chairman of this Committee).
(14) Auditing Committee.
(15) Budget Committee.

* In the case of (3), Nominating Committee, the Sectional Chairman shall appoint both the Chairman and members of this Committee.

Section C. He shall call at least two Sectional Committee meetings in any one calendar year at any optional time.

Section D. He shall, at the annual meeting, under election of officers, open up under nominations from the floor.

Section E. He shall be, ex-officio, a member of all Committees.

Section F. He shall call for a report from the Speakers Program Committee Chairman on the status of the program at any time he deems it necessary.

Section G. He shall establish liaison with the student chapters at their respective institutions.

Section H. He shall approve all bills for payment by the Treasurer.

Section I. He shall, in the event of his absence or inability to perform his duties as Chairman, notify the Vice-Chairman in writing in suitable time.

Section J. He shall notify the Chairman of the Nominating Committee in writing the offices to be nominated for the ensuing year.

Section K. He shall remind any members attending a Sectional Committee meeting that only the duly elected officers have the right to vote.

Article II. Duties of the Vice-President

Section A. He shall, in the absence or inability of the Chairman, preside at all meetings and perform the duties of the Chairman.

Section B. He shall be Chairman of the Speakers Program Committee.

Section C. He shall, with the Chairman, approve for payment by the Tresaurer all bills incurred by the Section.

Section D. He shall be Chairman of the Budget Committee.

Article III. Duties of the Treasurer

Section A. He shall collect all moneys due the Section and pay all bills incurred by the Section which have been approved for payment by the Chairman and the Vice-Chairman.

Section B. He shall keep books of account of all Sectional finances and shall present his financial report at the Annual Meeting of the Section.

Section C. The Treasurer's books of account shall be open to examination at any time by the Sectional Committee.

Section D. The Treasurer shall submit his books to the Auditing Committee on or before November 1st of ecah year.

Section E. He shall be a member of the Budget Committee.

Article IV. Duties of the Secretary

Section A. He shall be the custodian of the records and printed literature and such properties as the Section may hold for distribution to its membership, the National Council, or the public.

Section B. He shall keep, prepare for distribution, and distribute to the members of the Sectional Committee, whether in attendance or not, the minutes of the Sectional Committee meetings.

Section C. He shall prepare and mail to the Sectional members proper notices for each meeting.

Section D. He shall provide the means for maintaining the duties of his office.

Section E. On or before January 1st of each year the Secretary shall send a personal notice of election and a copy of the Bylaws to each new candidate elected to a Sectional office.

Section F. He shall be a member of the Budget Committee.

Article V. Duties of the Sectional Committee Members

Section A. They shall attend regularly all Sectional Committee meetings.

Section B. They shall help to originate, promote, and legislate the business of the Section.

Article VI. Duties of National Councilors

Section A. A National Councilor shall attend all Sectional Committee meetings.

Section B. He shall help to originate, promote, and legislate the business of the N.N.E. Section.

Section C. He shall represent the will of the N.N.E. Section in the National Council and shall be so instructed by the Sectional Committee.

Section D. The National Councilors representing the N.N.E. Section shall meet prior to each National Council meeting.

Section E. A National Councilor unable to attend a National Council Meeting shall notify the Sectional Chairman in writing. The Sectional Chairman shall then appoint as alternate, a senior member in good standing, preferably an ex-National Councilor.

Section F. The National Councilors shall report the minutes of the National Council Meetings which they attend to the Sectional Chairman.

Article VII. Duties of Speakers Program Committee

Section A. This shall be a Committee of five (5), a Chairman and four (4) members appointed by said Chairman.

Section B. With the approval of the Sectional Committee, this Committee shall name the meeting dates and provide speakers with suitable subjects for said meeting dates.

Section C. This Committee shall present a prospective schedule of speakers and subjects at the first Sectional Committee Meeting held in the fiscal year.

Section D. The Chairman of this Committee shall make a report of progress at each Sectional Committee meeting.

Section E. The Chairman of this Committee shall announce the program for the forthcoming Sectional meeting at each regular Sectional meeting.

Section F. The Chairman of this Committee shall obtain a copy or brief of the paper to be offered by the Speaker for presentation at the Technical Sectional meeting for approval by his Committee.

Section G. The Chairman of this Committee shall be prepared at all times to report the status of the program to the Sectional Chairman.

Section H. This Committee shall provide for the reception and transportation of the speakers to and from the meetings.

Article VIII. Duties of Intersectional Contest Paper Committee

Section A. This shall be a Committee of five (5), a Chairman and four (4) members appointed by said Chairman, one of whom must have been a member of this Committee the preceding year.

Section B. This Committee shall prepare a suitable paper to be presented at the Intersectional Contest held the second year following appointment of said Committee.

Section C. The Chairman of this Committee shall report the progress of his Committee at each Sectional Committee meeting.

Section D. The Chairman of this Committee shall be prepared at all times to report the status of the contest papers to the Sectional Chairman.

Article IX. Duties of the Nominating Committee

Section A. The Nominating Committee shall consist of five (5) Senior Members in good standing, no one of whom may be an elected officer of the Section.

Section B. This Committee shall present its report and nominations at the annual Sectional meeting. Each candidate so nominated shall be notified in writing by the Nominating Committee of his nomination.

Section C. This Committee shall be appointed not later than ninety (90) days prior to the Annual Sectional meeting.

Article X. Duties of Membership Committee

Section A. This Committee shall promote interest in securing new memberships.

Section B. All applications for membership shall be submitted to the Chairman of this Committee for his consideration and approval.

Section C. The Chairman shall report the progress of his Committee at each Sectional Committee meeting.

Article XI. Duties of Corporate Membership Committee

Section A. This Committee shall promote interest in securing new corporate memberships.

Section B. The Chairman shall report the progress of his Committee at each Sectional Committee meeting.

Article XII. Duties of the Annual Outing Committee

Section A. This Committee shall have full authority and responsibility for conducting the annual Sectional outing.

Section B. This Committee shall file a duplicate detailed report of its annual outing—one copy each for the Sectional Secretary and the Chairman of the next year's Outing Committee.

Article XIII. Duties of the Publicity Committee

Section A. To notify trade papers, magazines, newspapers, and broadcasting stations of meetings from notes provided by the Secretary.

Section B. To send to these same outlets write-ups of each meeting prepared from notes provided by the Secretary.

Article XIV. Duties of Dining Committee

Section A. This Committee shall arrange menus and prices for the regular Sectional Meeting Dinners, subject to the approval of the Sectional Chairman. This Committee shall provide and sell tickets for the dinners and shall pay all dinner expenses. This Committee shall give the Treasurer a detailed report of each dinner.

Article XV. Duties of Chairman's Advisory Committee

Section A. If at any time the Chairman deems an Advisory Committee necessary he shall appoint said Committee to be composed preferably of ex-Sectional Chairmen.

Article XVI. Duties of Seating Committee

Section A. This shall be a Committee of one, preferably an ex-Sectional Chairman. This Committee shall arrange the seating at the head table at all technical Sectional meetings and shall assist latecomers in securing seats.

Article XVII. Duties of the Properties Committee

Section A. This Committee shall be responsible for the care and maintenance of the P. A. system, projection screen, and any other properties of the Section used at Sectional meetings.

Section B. This Committee shall provide and set up, ready for use, and remove and store after use, any and all such properties as are necessary properly to conduct a Section meeting.

Article XVIII. Duties of Bylaws Committee

Section A. This shall be a Committee of three (3) members—a Chairman and two members appointed by said Chairman.

Section B. The Sectional Secretary shall be a permanent member of this Committee.

Section C. This Committee shall receive, act on, and prepare proposals for additions and amendments to these Bylaws.

Article XIX. Students' Chapter Committee

Section A. The Chairman of this Committee shall be the Sectional Chairman. This Committee shall have at least two of its members present at each Students' Chapter Meeting to represent the Section.

(Continued on Page P208)

Cellulosic Fibers Group Meeting—

Textile Finishing Machinery*

EDWARD S. PIERCE
H. W. Butterworth & Sons Co.

THE subject of this paper is the development of textile machinery and the effect of these developments on the processing of textile fabrics. The paper deals primarily with the finishing of cotton fabrics because the majority of recent chemical and mechanical advancements have been made in this phase of textile finishing, and in this paper, it would be impossible to cover the finishing of all types of fabrics.

Before discussing new developments in textile finishing, I would like to outline briefly the general changes that have taken place in the field of textile machinery manufacturing during the last six or seven years.

Changes in Machinery Manufacturing

The era following the depression years found the average manufacturer with a rather obsolete machine shop and an inadequate engineering department. In general he was trying to satisfy himself and the trade, not with an expanding future, but with the manufacture of machines previously designed. The policy was to increase production of so-called standards, which would also tend to decrease engineering time.

Then came the War. Overnight the average manufacturer was expected to convert and produce materials of war: tank parts, anti-aircraft guns, rocket launchers, rockets, but he failed. He failed primarily because his machinery and his techniques were obsolete. In order, then, to meet the demands imposed upon him, he had to re-equip his shops completely. Finally, after a severe case of re-birth pains, he became co-ordinated and began the successful manufacture of almost all types and sizes of machinery at relatively high production rates. He became an efficient production machine shop and this is the organization and the equipment now available for the manufacture of textile machinery.

With the manufacturing end of the organization at a relatively high production level, it became necessary to develop the inadequate engineering department, to enlarge it many times, to improve it and to give it experience. This last phase of the work is a constantly changing process and will probably never be completely finished; but the average machine manufacturer hopes by proper designing, efficient manufacture and continual mechanical research to serve the textile industry better.

Now for the present day plight of the textile machinery manufacturer. We are in a dilemma. We are not mechanical engineers, nor are we chemical engineers. We have succumbed to the technology of today and have become specialists. We specialize in the rather delicate art of combining the request of the finisher, the demands of the chemist and colorist with the limitations of present day engineering. This is becoming quite a job and to do justice to it, some of us, even though we have degrees in mechanical engineering, have attended textile schools to study the basic textile chemistry and processes so that we might better understand problems that confront the chemist, the colorist and the finisher.

Our studies have made us aware of an extremely important fact. We now realize that the mastery of chemistry, dyeing and finishing is a full time project. It cannot be a hobby or a sideline. The new developments which are continually appearing must be thoroughly investigated and their merits determined, since a single improvgment in chemistry or equipment in the processing of textiles might mean the savings of many thousands of dollars of the operation of a textile mill. Therefore, constant and complete contact with these development is of cardinal importance.

We realize that the progress made by many chemical houses and dyestuff manufacturers is most remarkable and we believe that the correlation of results between actual mill application and laboratory technique is becoming much closer. This means that the chemists and colorists can reproduce nearly all possible mill conditions and thereby determine the strength and weakness of each process. This fact made us realize that new developments and basic changes in finishing and dyeing, in the future, will come almost exclusively from the chemist and colorist. This in turn convinced us that the design of machinery for new processes and new applications was a cooperative endeavor, requiring a complete understanding between the chemist and the engineer. This kind of cooperation is well illustrated by the recent developments in continuous "J" Box Bleaching.

Continuous Bleaching Process

The new continuous bleaching process for cotton piece goods started commercially just before the war. It was perfected during the war years and contributed materially to the production of fabrics badly needed by the Government, and was accepted widely in the cotton piece goods industry.

The continuous bleaching process is fundamentally a simple process. In the large piece goods bleacheries it is generally considered as embodying two separate stages. The first stage is a preparatory treatment, in which the goods are impregnated with caustic soda; the second stage is the bleaching process proper.

The conditions in the preparatory step are adjusted to suit the needs of the cloth being processed. For instance, on white cottons, the cloth is usually saturated with about a 3% solution of caustic soda, previous to its passing into the "J" in a heated condition for one hour. After this it is immersed and washed. Caustic treatment is used here for the same reason as in kier-boiling—to remove a large portion of the non-cellulose materials present in the cotton.

In the preparatory step, the motes have been softened and the cloth made quite receptive to bleaching. The bleaching proper takes place in duplicate equipment with a saturator used in impregnated hydrogen peroxide in varying concentrations, to suit the degree of bleaching required.

The continuous bleaching process is currently being used to bleach materials such as cotton piece goods and yarns. There are two variations of the process. In the majority of cases the rope system is

* Presented at the Cellulosic Fibers Group Meeting, George E. Osha, Presiding, National Convention, Chicago, October 24, 1947.

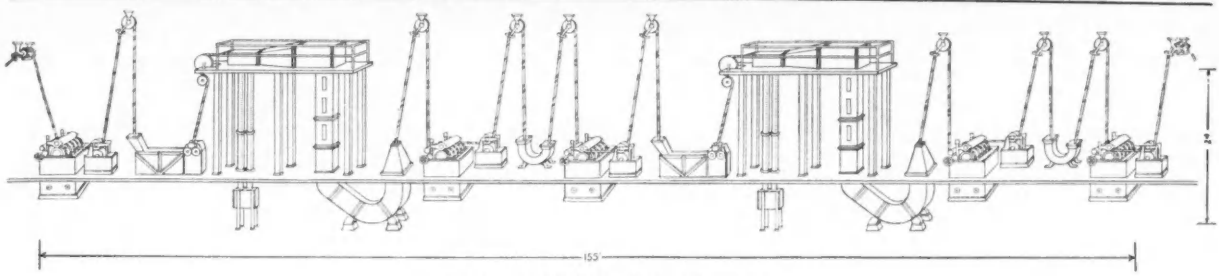

Figure 1. Tight Rope Washer Installation

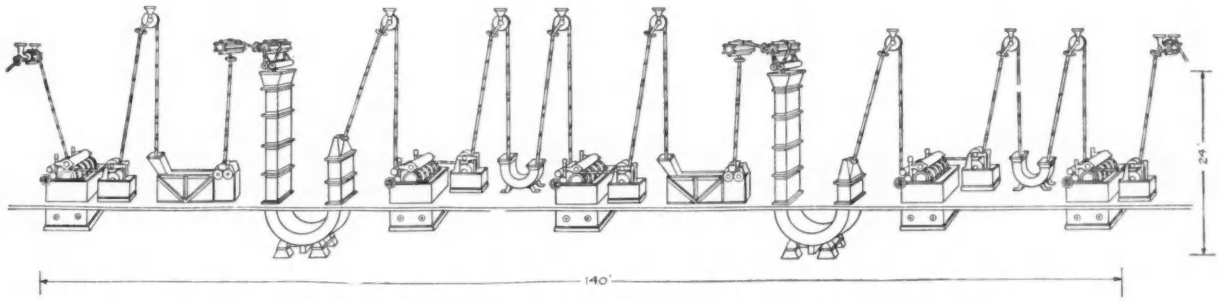

Figure 2. Tight Rope Washer Installation Showing Variation in "J" Boxes.

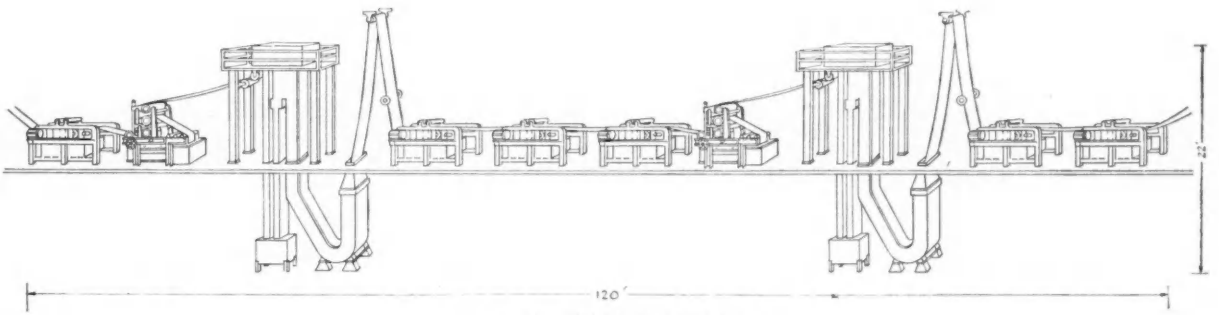

Figure 3. Open Width Bleaching Range.

used because it is easier to handle the cloth in the rope form and because higher operating speeds can be obtained. However, on heavy goods that are bleached before dyeing, care must be taken to prevent crease marks. For this sort of work the open width equipment is generally used. In both systems the sequence of operations is the same; the difference is only in the method of handling the cloth.

It would be interesting at this point to note the marked difference between kier-boiling and continuous bleaching. Based on a daily production of 25 tons of 5-yard material, the following significant comparisons can be made:

Continuous bleaching uses 25% less floor space; the cost of labor in some instances has been decreased as much as 40%; the steam consumption has been reduced 75%; the time for the first yard of goods to be completely processed has been reduced from 20 hours to 2 hours and in addition to these economies the necessary equipment has been materially reduced—two 3000 lb. "J" Boxes have replaced six 4-Ton Kiers. These figures vary slightly depending upon the weight and construction of the cloth.

The illustration (Fig. 1) shows a tight rope washer installation. Here the cloth is washed in a tight rope washer, passed through a squeezer and then enters a saturator, where it is impregnated with a caustic soda solution; then through a poteye into the steaming tube of the "J" Box. After proper steaming, the cloth passes into the "J" where a folder plaits the goods down into the "J" Box in a uniform condition front to back, as well as across the width of the "J" Box. The cloth is next washed in a tight rope washer, passed through a squeezer and timing scray and then to another tight rope washer and squeezer. This is followed by an application of hydrogen-peroxide in a peroxide saturator. The goods are then passed over reels through a poteye, steaming tube and "J" box, the same as previously described, and the goods are then passed through a tight rope washer and squeezer. Fig. 2, illustrates another variation in continuous bleaching equipment. The difference between this range and the range illustrated in Fig. 1 is only in the type of "J" box used and the mechanical arrangement of the piling device.

The open width bleaching range (Fig. 3) begins with a 6-roll horizontal washer followed by a saturator where the cloth is thoroughly impregnated with a caustic soda solution. The cloth is then steamed through a steaming section and plaited down into the "J" box. After leaving the "J" box, the cloth is thoroughly washed in three 6-roll horizontal washers. This brings the alkalinity of the cloth down

to ¼ of 1%. The cloth next goes to a saturator where it is impregnated with a solution of hydrogen-peroxide. The cloth now passes through a steaming section, goes on into the "J" box where it remains for approximately one hour to allow the cloth to bleach thoroughly. It is removed and given a thorough wash.

A continuous bleaching process such as this makes it possible to carry out quality bleaching at lower-over-all cost. Its flexibility allows a variety of goods to be processed. Bleaching is carried out under controlled conditions at all times.

Although some of these ranges are quite lengthy, they are made up of basic components which are repeated. You can appreciate the simplicity of the chemistry involved in these ranges and you might ask why this process wasn't developed long ago.

Well, 15 years ago the Butterworth Company thought the same thing, when they started manufacture of a Monel metal "J" Box for the first attempt at continuous boiling-off. They believed that if they could succeed at continuous boiling, then peroxide bleaching would be relatively easy. The first installation was unsuccessful, so it was returned to our shop where it was modified, added to and changed. The machine was then shipped to another textile mill where it became the first mill size bubble bath and was therefore, returned again. Finally after one more unsuccessful installation, the equipment was scrapped.

Today, as we look back on this unhappy venture and compare it to present day continuous bleaching systems, we realize how close we were to manufacturing a successful unit. We were off in our chemistry, we just didn't know enough, and it took a chemist, working without knowledge of *our* past errors to develop the first working procedure.

At this point I might mention that the accompanying illustrations do not represent the latest developments in continuous bleaching. We have recently developed a new "J" box that is more compact, faster and less expensive than its predecessor. The mechanical design is such that there is no longer any need for internal lubrication, which eliminates marking off on the fabric; nor is it now necessary to worry about proper piling and cloth control even at high speeds. The illustration (Fig. 4) shows the comparison of the old "J" box to the new, with the resultant saving of floor space.

The new "J" design coupled with ingenious plant layout can accomplish a saving of 20% in floor space previously considered necessary for proper accessibility and control. We were forced to design a new high speed slack washer when we discovered that our "J" box could operate at speeds in excess of 200 yards per minute. As a final illustration of developments in continuous bleaching, we recently designed a complete single stage bleaching system for knit goods with a special entering section to minimize tension, a slack washer, and an impregnator. Imagine a complete high production bleaching range in 44 feet!

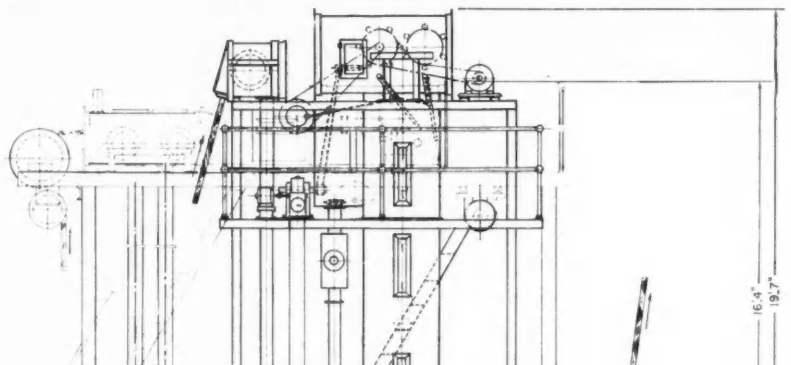

Figure 4. Showing Comparison of New "J" Box to Older Design.

Tenters

The chemist with his improved wetting agents, new starches and finishes has even invaded what was once considered a purely mechanical phase of textile finishing—that of tentering. The mechanical action of a tenter is to maintain a pre-determined width, while the functions of steaming, drying, starching, mercerizing, dyeing or curing are performed on all types of fabrics. With new chemical improvements increased speeds become a standard rather than the exception. Therefore, it became necessary to design a machine that was capable of speeds as high as 300 yards per minute for drying and steaming and 100 yards per minute for mercerizing.

When these chemical improvements were placed in the hands of the finishers there came an immediate demand for a new machine—a high speed, quieter operating, more efficient tenter. This resulted in a series of designs, tests and model making, so that we could incorporate our experience and new ideas into this tenter.

After completing our designs on these new tenters and having tested them in actual mill installations, we realized that we had designed a machine that had a serious weakness. The chain of the tenter, made of malleable iron which has been satisfactory for the past 25 years, was wearing excessively at speeds in excess of 150 yards per minute on high speed tenter operation and 50 yards per minute mercerizing.

Investigation proved that the materials of construction were not capable of transmitting the required horsepower. Also, the co-efficient of friction between the chain and the guides was excessively high when using malleable iron and another material had to be found to reduce this friction. The following specifications were drawn up, which in our opinion, would create a tenter chain that would incorporate all of the desirable features that our 45 years of experience in the manufacture of chain has given us.

The chain itself should be made from materials whose final specifications both for uniformity of nature, tensile strength

and hardness could be depended upon. The chain itself should have a tensile strength of at least 75% more than the maximum tensile strength that could be obtained with malleable iron. The wearing surface of the chain should be hardened. The ideal chain should have a shorter pitch than 4" commonly found in tenter chains, both our own and other manufacturers.

After a chain meeting the above specifications has been produced thus eliminating to a large degree maintenance on the wearing parts itself, the cloth holding part of the clamp should be readily detachable without disturbing or removing the rivets from the chain. Thus the operator can change a damaged clamp readily or make repairs on either sections or complete chains without dismantling the tenter itself.

All of these specifications have been met, tested and approved in operation and are embodied in the No. 43 tenter chain and clamp.

The change in the pitch of the chain reduced by 40% the natural vibration of the chain entering and leaving the idler sprocket and the impact loads and strains are greatly reduced. Operation is comparatively quiet even at high operating speed. With the successful development of this tenter chain it is now possible to receive the full benefits of high speed tenter operation heretofore not possible on standard tenters.

The development of the new high speed tenter is another example of demand-designing which causes new textile machinery to be designed and built. The consumer's demand which makes the grey goods demand which makes the finisher demand which makes the chemist demand which makes the machinery manufacturer design.

Continuous Vat Dyeing

Another example of the cooperation between the chemist and machinery builders is embodied in the vat color development.

The class of colors most widely used today is a vat group. This type has predominated for the last twenty years, not because of new colors, but because of the demand for faster colors and improved application techniques. Although few new colors have been added, they are greatly improved in purity, standardization and physical properties.

It was a practice in the past to pad vats as pigments before jigging. Specking was a major dyehouse complaint and it was a MUST to use some dispersing agent or protective colloid. Today, vat colors are in a dispersed state so fine and so stable that such troubles are very infrequent.

Continuous dyeing machines for indigo with large volume vats have been in use many years, but it was just about twenty years ago that the beginnings of continuous vat dyeing for all vat colors were made. From that time many experiments in methods and equipment have been made. Without attempting to go into these in detail, I will state that the most widely used procedures have been to pad the reduced color, then pass the cloth through a booster solution which contains some color, caustic soda, hydrosulfite and salt. The difficulties arising from the different exhaustion rates of reduced vat colors have been attacked by studying the substantivity of the individual colors and attempting to feed liquors with the concentration of individual colors to allow for these differences. The mechanical approach to the solution of this problem tended towards the use of smaller volume pad boxes, shorter immersion time and greater squeeze pressure.

For the last ten years an increasing amount of vat dyeing has been done by coloring the unreduced vat colors either with or without subsequent drying, followed by reduction and finally by dyeing. The improved dispersion of the vat paste delivered to the dyer has made this process possible.

Two new schemes for reduction of vat pigments have been quite recently proposed and found very prompt acceptance. These are the pad steam process developed by duPont and the method of using the Williams units. These are both being discussed so vigorously and sometimes violently, that it seems certain that the full use and understanding of both have not as yet been reached. In principle, there is a similarity between the two, in that the reductions are carried out in very short times and at high temperatures.

In the pad steam method, there is in a sense, no reduction bath. The printed part of the cloth is mangled through a solution of caustic soda and hydrosulfite, then entered into a steam box similar to a vat print ager where the color is reduced and the fiber dyeing takes place. In the Williams unit, the box is built to use a minimum of liquor. The pigment padded cloth is passed directly into the caustic and hydro solution at temperatures near the boiling point, with the result again that the color is reduced and the cloth is dyed where the color has been placed on the fabric by the padder. This takes place without appreciable migration.

Both processes at this time seem to be a decided forward step from the reduced pad and booster method, with the complete merits and limitations of both, not fully explored. However, jig dyeing of vat colors on piece goods seems to be definitely on the way out because of both the cost and the quality advantages of these new processes.

Taking the pad steam method as an example, I would like to describe how your machinery manufacturer develops mechanically the equipment necessary to successfully complete the chemical proces

First, we try to make the machine fo both rayon and cotton. With this in min it is necessary to keep the tensions to minimum. Therefore, it is our problem to develop a new type of steam seal to put a minimum frictional restriction on the rolls. We must have no condensation, we can have no excessive steam leakage, but, we must have easy access for threading the machine which must work behind a padder and before a washer. It should have adjustable tension; this is necessary to prevent scrimping. It should be constructed of a non-oxidizing metal; it should have a certain capacity and finally it should be made for a reasonable price. With these restrictions and with our experience, we begin our design. The chemist and the engineer start their work with a laboratory model, complete in every de tail. By observing the model in operatio the chemist alters, changes and redesign the engineer improves, condenses, and re duces cost. With the results obtained from the laboratory machine as a guide, we now proceed to design and manufacture the full size machine. The first production machine is in operation for hardly a month when the chemist finds that by adding a booster bath numerous advantages can be obtained in reducing preparation time on cotton piece goods. He also finds that by changing the box construction and varying the speeds, sulfur and Indigosol colors can be successfully dyed and by the addition of a refrigeration coil, naphthol dyeing could be considerably speeded up. Therefore, the machinery manufacturer redesigns the machine to suit the revised conditions.

In this new machine we have embodied most all the requests of the chemist; however, the cost of the machine is pro hibitive for a large number of textil mills. Now follows a series of consulta tions between the chemist and the engineer and it is found that with a large majority of users, a smaller machine with a top speed of 125 YPM is most practical So, the machinery builder condenses hi machine to reduce costs and for the mo ment everybody is happy. But, only fo the moment. Yes, we are now in the process of designing our fourth type of vat steamer, incorporating what we have learned in the previous three types and adding experimental provisions for the

continuous dyeing of cotton warp. If this is successful it would mean a revolutionary change in warp dyeing.

All right, so we've designed a pad steam range in collaboration with the chemist —how does this interest and affect the finisher? Here are the comparisons:

Pad Steam Range: One complete unit consisting of two pads, hot flue dryer, steam development unit and seven wash boxes, at a theoretical speed of 125 YPM should produce an average of 6,000 yards per hour or 48,000 yards in an eight hour shift. It will require 1,100 square feet of floor space. For proper operation a crew of four men will be required plus the part time service of a color weigher and mixer.

Jig Development: To produce an equivalent yardage of vat dyed goods at the rate of one 1,000 yard roll per four hour period, will require from 20 to 24 jigs. These will take up a floor space of 2,300 square feet. In addition, the use of a pigment padder taking up the space of 450 square feet and roll benches for storage, requiring a space of at least 500 square feet will be necessary. A total of 3,256 square feet.

One man will run from two to three jigs depending upon local conditions so that at an average of 2.5 jigs per man, ten men will be required plus the part time service of a color weigher and mixer.

Cost Comparison: Vat colored work will show on the average about a 40% reduction in chemical cost, with the color cost from equal, to in some cases 10 to 25% better value in favor of the pad steam. In addition, the pad steam method offers considerably better shaded work, no jig ends to be trimmed back, thus resulting in better out turn per lot and the saving in cost of jig leaders, which in some plants, can run into considerable money over a period of time. In cases of a comparison with previous continuous vat dyed work, the pad steam offers full development of color as compared to pad jig and greatly increased economy compared to conventional continuous reduced or pigment work, permitting the production of practically any depth shade formerly requiring the use of jigs.

These figures represent a saving in labor, chemicals and floor space large enough to demand the interest of mill owners and finishers.

In the early part of my dissertation on pad steam dyeing, it might have seemed that the Butterworth Company was disgruntled by having to design four steamers to satisfy the chemist. The answer is a definite "NO." We are not complaining. We believe that we are entering a new phase of textile thinking, textile engineering, and textile chemistry. We believe that changes in processes, basic chemistry and new techniques will continue at a high rate and that these changes will of necessity require new machinery—and we like that.

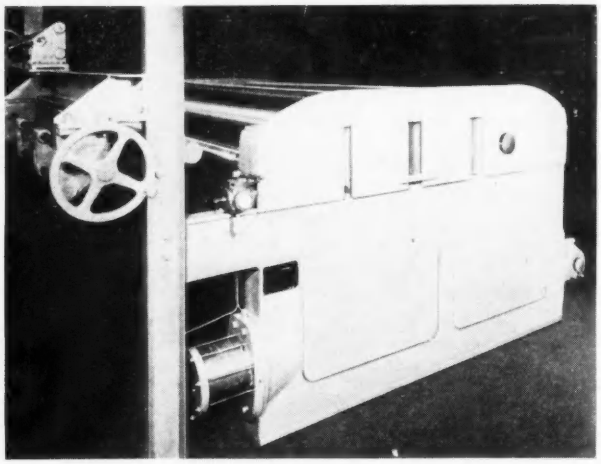

Figure 5. Three-Roll Horizontal Padder

That is why we build large quantities of laboratory equipment—pads, steamers, agers, washers, printing machines, jigs, dryers, etc. It is also why we believe that the chemists and colorists will be responsible for the majority of changes and improvements in the future.

You have probably noticed a similarity of equipment in both the bleaching and vat dyeing processes. You can imagine that by continuous mechanical research and experimentation the machinery manufacturers might some day establish some standards. In the past he has been unwilling to take the responsibility for the exact performance of his machinery since the customer, with his experience in the actual performance of the machine, had much more information than did the machinery builder. This has led to an almost impossible condition in regards to standards.

New Machinery Designing

We are working to correct this condition by designing our machinery to be more flexible, more interchangeable, and more basic.

Take for example the new three-roll horizontal padder (Fig. 5). This machine is an extracting mangle, a caustic impregnator, a universal padder, a starch mangle—all of these diversified applications with only a variation in boxes. With a change in the rolls, the machine becomes a 15-ton rayon calender. Rolls of any diameter can be used without new parts or major revisions.

The developments in tenters also reflect our efforts to standardize. The new high speed automatic tenter operates at speeds in excess of 200 YPM and uses the same drive shaft, reduction heads, bearing support rails, etc., as the new high speed overhead drive mercerizing tenter.

If the machinery manufacturer can convince his customers on the merits of this type of versatile machinery, thereby justifying mass production of parts, a considerable saving could be reflected to the customer, and, in normal times, deliveries could be accelerated.

I think you will also notice in the new machinery appearing in the textile field, a marked improvement in appearance and design. As an example of improved design, consider the newly designed pneumatic cut-off winder equipped with a slitting device. (Fig. 6). The sole function of the streamlined enclosure is to improve the appearance of the machinery—the performance has not been improved.

We have recently designed machines to perform numerous operations on a new type of fabric and we expect them to be versatile enough to run rayon, cotton and wool. These machines incorporate functional, modern and streamlined design. In this process it is necessary that the operator have complete control of all the mechanical variations possible on these machines. Therefore control panels are built-into the compact overall design. The enclosure in this type of machine is functional (Fig. 7).

These machines illustrated are possibly a little ahead of the customer's demand like the old Chrysler Airflow and the present back-front Studebaker automobiles. We don't yet know whether our customers want this type of designing, but we hope to be prepared if they do. Be assured however, that some day most

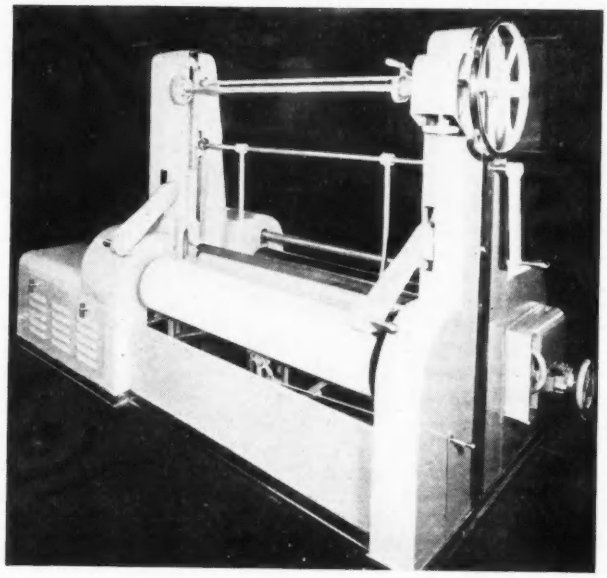

Figure 6. Pneumatic Cut-off Winder

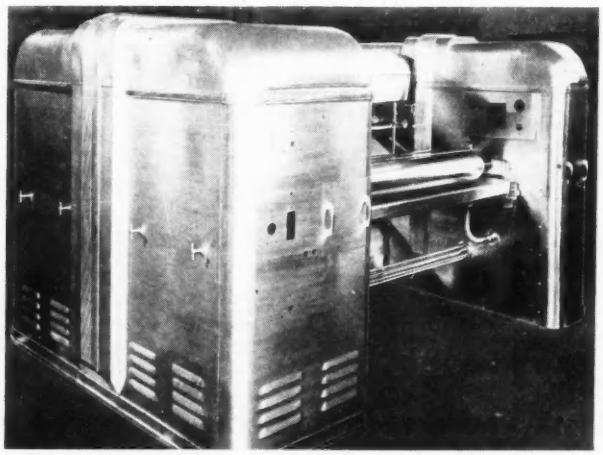

Figure 7. Wetting and Print Unit Incorporating Functional, Modern and Streamlined Design

all textile machinery will have a pleasing appearance.

In new designs and new developments, the engineer sometimes finds himself in rather embarrassing circumstances. For example, the Butterworth Company having just completed exhaustive tests on a truck bleaching system for knitted fabrics, now diverts their designers to develop a new continuous system of knit goods boiling-off bleaching, and washing.

This means that we have wasted our time, or are about to waste our time—as one of these processes will be obsolete within the next year.

We are also completing tests on a combination padder and jigger for rayon and cotton. This machine has a wide speed range, tension adjustment, automatic reversal as some of its features. Simultaneously, the chemist and the engineer continue research on pad steam dyeing, which if completely successful will make the pad-jigger obsolete for production dyeing.

There are several more examples of the double designing which is deemed necessary in order to investigate new mechanical improvements in textile machinery. For you know that in these days of advanced chemical and mechanical developments, the entire textile business is in a state of flux. We are continually learning more about our business, our machines, and your chemicals, and we will continue to try to keep up-to-date with these changes.

The machinery manufacturer cannot take full credit for the improved design, increased flexibility and increased production in recent textile machinery. For behind his engineering are the resources of General Electric, Westinghouse and Reliance for motor equipment; Foxboro and Brown for instrumentation; Timken, SKF and Fafnir on bearing problems, as well as our raw material suppliers and innumerable others, who have brought their ideas and products to our attention. They all add up to a better product. Without the help and direction of our suppliers we would be unable to more than scratch the surface in the design of new machinery.

In conclusion, I would like to give a few personal predictions of things to come:—

Bleaching, good bleaching, at 300 yards per minute.

The conversion of slow speed bleaching ranges to high speed operation by adapting the recent mechanical improvements.

The continuous dyeing of cotton warp in converted pad-steam units.

Improved mercerizing of cotton piece goods at speeds of 125 yards per minute and better.

The use of electronics and high frequency energy adapted to improve, control and reduce costs in continuous dyeing processes.

And finally, I predict that increased co-operation between the chemist and engineer, resulting in better finishing, improved textiles and much, much better textile machinery.

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Hosiery Group Meeting

National Convention, Chicago, October 24, 1947

Chairman Siegrist: First of all, on behalf of the Mid-west Section I would like to bid a welcome to any members of other sections here.

We have three papers on the program this afternoon, and before beginning my own, I would like to introduce Charles Ainsworth of the Holeproof Hosiery Company, who has done a great deal of this work, and deserves the major credit.

. . . Mr. Siegrist then presented his paper. . .

* * * * *

Hosiery Group Meeting—

Current Developments in Hosiery Dyeing*

E. J. SIEGRIST

Holeproof Hosiery Co.

THE past year or so has seen a decided change in the trend of women's fashions. Along with the new silhouette has come an increasing demand for dark sheer hosiery. This demand presents entirely new problems to most hosiery dyers —perhaps to all except those who have dyed men's hosiery in the dark shades. The demand for sheers also presents interesting problems in dyeing and finishing. New developments in nylon yarn manufacture are bringing finer count yarns, some of them in single filament form. For these reasons this discussion will have to do with two topics: first, the dyeing of light and medium shades of hosiery made of a combination of monofilament and multifilament nylon yarns; and secondly, the dyeing of dark shades on both men's and women's nylon hosiery—with special emphasis on the selection and use of dyestuffs.

Monofilament in Combination with Multifilament

An increasing amount of monofilament yarn is being used in hosiery manufacture, usually together with multifilament yarns in welts or reinforcings. The problem of obtaining a good dye job, particularly with respect to union between the monofil and multifil portions, has been widely discussed and perhaps there is little to add; however, some observations may be of interest. Take for example, a stocking made of 15 denier monofil in the leg and 40 denier 13 filament in the welt and reinforcings. In dyeing such a stocking with acetate dyes in light or medium shades, it is generally considered necessary to control the temperature during both preboarding and dyeing. Best results in preboarding are not necessarily related to best results in dyeing. It has been claimed that low preboarding temperatures produce better unions than high. Actually, we have found that low temperatures such as 215° F. or 220° F. are satisfactory if the time cycle is sufficient for a good set, and that as temperature is increased in preboarding, the shade in dyeing changes but the union between the monofil and multifil portions of the stocking is very slightly affected. The difference in the final dyed shades obtained between stockings preboarded at 215° F. and 270° F. is considerable and is shown in dyeings D and E. The dyes used in this case were Scarlet B—Pr. 244, Blue FFS—Pr. 228 and Yellow G.C. It is evident that the stockings preboarded at the higher temperature show a greater exhaust of Scarlet B. This seems to be true not only in the leg but in the welt and reinforcings. Thus it seems reasonable to say that control of temperature in preboarding should be used to obtain the desired set, shrinkage, shaping and final appearance rather than to aid in obtaining unions. For this reason a moderately high temperature, in the range of 250° F. to 260° F. is recommended.

However, when the effect of temperature control in dyeing is considered, we find a different story. If acetate dyestuffs are used, high dyeing temperatures apparently favor the monfilament yarn. Time is also an important factor. High temperature and prolonged time result in heavier monofil and lighter multifil portions of the stocking. The result is a poor union. Experiments in the laboratory and numerous practical runs have shown that a temperature of approximately 150° F. results in the best unions; but no definite rule can be adhered to because of the selective affinity of nylon fibers for various dyes. A temperature of 150° F. is best for the combination of dyes mentioned before. At 160° F. there is a marked increase in depth of color and shade on the monofil yarn, while at 200° F. the difference between welt and leg becomes extreme.

Another important consideration in this problem is the selection of dyestuff. In cotton, rayon, silk, or wool dyeing, we all know that when two or more dyestuffs are used together to produce a desired shade, best results are obtained when we choose dyestuffs with similar dyeing characteristics. If they behave alike in speed of exhaust, temperature of maximum affinity, ability to migrate or level etc., there is little trouble; but indiscriminate choice invites disaster. Why, then, do we expect miracles to happen when we dye nylon? Consider what took place in rayon hosiery dyeing, when a cuprammonium leg was combined with a mercirized cotton welt. Compare this to our problem of monofil and multifil leg and welt and it becomes evident that even within a range of acetate dyes, some will do a better job on unions than others. Laboratory work done to date indicated that the suggested temperature of 150° F. can be increased if he proper dyes are used. Levelling is much more difficult at a low temperature than at a high one and this is another reason for choosing dyes that will yield good unions at temperatures approaching the boiling point. The following method of selecting dyes for this type of work is suggested.

Beginning with a red, yellow and blue, a series of dyeings are made at various temperatures, for example 150°, 175° and 200° F. The blue and yellow are maintained as a constant, but various reds are used, the final selection being the red which yields the best union at 200° F. Then the blue and red are kept constant in another series and various yellows are tried. Finally with the yellow and red as constants, the blue is chosen. This method has been found more practical than separate dyeings of individual dyestuffs because variations in the red, yellow, or blue components of the formula are much easier to see in combinations. Experimental work of this nature may seem a waste of time to some, but some knowledge is always gained. If your experiments result in a combination that will yield good unions at 175° F. instead of 150° F., levelling will be better and time will be saved.

Selection and Application of Acid Colors for Dark Shades

The foregoing observations are not entirely true when we talk of dyeing with the acid color, because demonstrations have been made showing that, in the very dark shades, some of the acid color combinations can be used successfully even when dyeing at temperatures as high as

* Presented at the Hosiery Group Meeting, National Convention, Chicago, Oct. 24, 1947.

200° F. Again, dyestuffs show markedly different properties in this respect, as will be demonstrated later.

In the dyeing of dark shades, either on women's or men's hosiery, we find new problems. We must search for dyestuffs that will give us better fastness to washing and light than the acetate colors do. Speaking of nylon in general, without distinguishing between the monofilament and the multifilament yarns but classifying them as a whole, the fiber exhibits a selective behavior toward acid colors to a much greater extent than is the case with the dispersed acetate dyestuffs. Because this subject is so extremely interesting and timely it was thought worthy of considerable investigation.

Many of you will recall papers presented by P. H. Stott at the annual meetings in Boston during Septemmer of 1939 and again in New York during October 1940. Both of these papers dealt with the dyeing of nylon fibers with acid colors. Unfortunately, Mr. Stott's death took from us one of our most valued members, and a man who contributed greatly to such programs as this. His approach to the various problems was extremely practical. In the first of these papers, Stott classified practically a complete range of acid dyestuffs, separating them into groups with relatively little or no affinity, with fair affinity, good, very good, etc. He further classified them for this property both in neutral and acid baths. In the paper delivered at New York in 1940 entitled: "The Dyeing of Nylon Fibers with Acid Colors", a group of dyestuffs having comparatively good affinity for nylon were re-classified for saturation point, speed of exhaust, and relative affinity from a neutral dye bath. This paper was published in the American Dyestuff Reporter, November 25, 1940. We have drawn greatly upon this work in presenting the data to follow. Stott emphasized the importance of color selection on the basis of the three factors mentioned. He defined saturation point as the percentage of color absorbed by nylon under specific dyeing conditions, determined at the point where the dyestuff ceases to be absorbed, in the same relation as the quantity present in the dyebath. Speed of exhaust was determined by entering 5 gram skeins of nylon yarn into a dye bath, each skein being entered successively and dyed for 5 minutes. The amount of color on each skein was then evaluated in terms of an original dyeing of 1½ percent and those colors showing 90 to 100 percent exhaustion in 5 minutes were classified as very rapid; 80 to 89 percent, as rapid; 70 to 79 percent, as medium; and 55 to 69 percent, as slow. The relative affinity from a neutral bath is expressed in the amount of color absorbed by nylon fiber from a neutral bath containing 40 percent Glauber's salt in one hour at 190° F., using as a basis for the original percent of dyestuff one-half of the saturation point. By comparing this neutral dyeing to a series of similar dyeings made from an acetic acid bath, the relationship between the neutral and acid dyeing was determined and expressed in percent. The importance of selecting dyestuffs for combination dyeing on the basis of saturation point, speed of exhaust, and neutral affinity is immediately apparent to any of you who have attempted to dye dark combination shades with acid colors. Compared to either wool or silk the affinity of nylon for most acid colors is relatively poor and decidedly more selective. For this reason, we must have methods or tools to help us in selecting a proper combination of dyestuffs if we expect to achieve satisfactory results.

By reference to the Table contained in Mr. Stott's paper, as well as the examples he gave, any dyer following his recommendations and methods for dyestuff selection will be able to select a workable combination for a given shade.

In our own observations during experimental work, it was noted that while some of the dyestuffs were not suitable for use in a neutral bath, the color value in an acid bath was satisfactory. We also noted that with other agents, instead of acetic acid, for example, with magnesium sulfate or epsom salt, the color value obtained from a certain dyestuff, as well as the saturation point, was very close to that obtained with acetic acid. Obviously in hosiery dyeing, particularly where nylon is dyed in combination with cellulose fibers, the use of acid is objectionable. We thought it worth while to investigate the behavior of a range of dyestuffs, dyeing in the presence of Epsom salt.

A series of dyeings were made each using an individual dyestuff and varying percentages of Epsom salt. Each dyestuff was tried at approximately half the saturation point with 2½, 5, 10, and 20 percent of salt. There was apparently no difference in the color value obtained between 2½ and 20 percent, so that the amount of salt added did not seem to have any bearing on the result achieved. Apparently the presence of the salt, rather than the amount, is the important factor. Further experiments were conducted arbitrarily using 10 percent of Epsom salt, at the same time running 2 sets of parallel dyeings, one set in a neutral bath using 40 percent of Glauber's salt, and the other set in an acid bath containing 5 percent acetic and 40 percent Glauber's salt. All of these were dyed at 190° F. for one hour.

These dyeings are displayed as series A, and for each dyestuff the dyeing at the left is neutral, the one in the center is dyed with Epsom salt, and the one at the right with acetic. A study of these dyeings shows a decided increase in affinity for both Epsom salt and acetic acid over the neutral dyeings, and furthermore in several cases the affinity with Epsom salt is greater than with acetic. The approximate affinity with Epsom salt as compared to acetic is shown in Table I.

The results obtained in Series A seemed to warrant further study and it was decided to try combinations of two or more dyestuffs using 10 percent Epsom salt. We have purposely used dyes which will best illustrate the importance of properly selecting individual dyestuffs for combination work. Selection was made chiefly on the basis of saturation point although it was realized that speed of exhaust and neutral affinity are important considerations in practical dyeing. In Series 1 Sets Nos. 1, 2 and 3 show the results of combining 3 different yellow dyestuffs with the same blue. In all of these dyeings the blue ingredient, common to all, is Alizarin Sky Blue B, Colour Index No. 1088; saturation point is approximately 3.0 percent. The yellows are: in No. 1, Milling Yellow 2 GC—saturation point less than 1 percent; in No. 2, Chrysophenine—Colour Index No. 365, saturation point 3.0 percent; in No. 3, DuPont Neutral Yellow GS, saturation point 6.0 percent. In each of these sets, concentrations of 1, 2, 4 and 6 percent total dyestuffs are shown, in all cases consisting of equal parts of yellow and blue. In ad-

TABLE I

Color Name	*Index-Number*	*Less*	*Equal*	*Greater*	*Approximate Saturation Point*
Polar Yellow	642	x			1.00%
Sulfon Cyanine Black B	307		x		4.00%
Cloth Scarlet G	275	x			2.50%
Chrysophenine	365	x			3.00%
Alizarine Sky Blue B	1088			x	3.00%
Neutral Yellow GS (DuPont)	...			x	6.00%
Polar Red	430	x			1.50%
Neutral Brown 2 RS (DuPont)	...			x	2.50%
Sulfon Cyanine 5R Ex	289		x		3.00%
Wool Fast Blue	833		x		3.00%
Metanil Yellow	138				1.25%
Pontacyl Ruby P.L. Conc	..		x		5.00%

dition to the original dyeings on nylon hosiery, we show silk swatches which were used to exhaust the color remaining in the bath. These exhausts were made with the addition of 5% sulfuric acid in order to pick up as much remaining color as possible.

At this point let us remember, first, that dyestuffs for combination shades should have saturation points as nearly alike as possible and secondly that the total practical percentage should not exceed the saturation point of the lowest dyestuff in the combination. Bearing these facts in mind, let us examine sets Nos. 1, 2, and 3 in series B. In No. 1, the original dyeing is not green but blue and the exhausts are a very yellow green, but in No. 3, while the original dyeings are all green, the exhausts are all blue with the possible exception of the 5% dyeing where the saturation point of the blue has been exceeded. In dyeing No. 2, however, where both the blue and the yellow have saturation points of approximately 3.0%, the original dyeings are green and the exhausts are also green. Which of these combinations would you choose? Have you ever dyed a green, and upon sampling decided to add just a little yellow, only to find on the next sample that the blue predominated more than before? Consider the reason!

Series C shows the results in a three color combination. In this case dyeing No. 1 was made with Yellow 2GC, Polar Red, Colour Index No. 430, saturation point 1.5 percent and Alizarin Sky Blue B. Dyeing No. 2 was made with Neutral Yellow GS, Pontacyl Ruby PL, saturation 4 percent and again Alizarin Sky Blue B. Here, the blue is again common to both dyeings and in No. 1, we have low saturation yellow and red, while in No. 2, we have high saturation yellow and red. In both of these sets of dyeings four strengths have been used: beginning with ¾%, the second dyeing 1½%, the third 3%, and the fourth 4½%. This refers to total dyestuff, and equal parts of red, yellow and blue have been used in all cases.

Note in dyeing No. 1 that when the saturation point of the blue is approached, the saturation points of the yellow and red have already been exceeded. Consequently, the dyeings progress toward the blue and this is clearly demonstrated by the exhaust dyeings on the silk swatches, where in Nos. 3 and 4, practically no blue is discernible but great amounts of red and yellow. In dyeing No. 2, however, while all of the dyeings from ¾ to 4½ percent are a brown cast, we can see that when the saturation point of the blue is approached, yellow and then red continue to be absorbed. While neither of these combinations is an ideal one, certainly No. 2 is by far the better choice. In fact, for dyeing a heavy red-brown shade, it would be absolutely futile to use a combination like that demonstrated in No. 1.

Now after examining these dyeings, let us consider their practical value. First of all, where combination fibers are used, as for example, nylon in the presence of cotton or rayon, the Epsom salt method of dyeing certainly shows promise. In men's hosiery, it would be practical to use direct colors in combination with these selected acid colors for heavy shades, and by substituting Epsom salt for acetic, the hazards of an acid bath are eliminated. Some precautions, of course, are necessary in using a salt like Epsom, and it is strongly recommended that one of the synthetic detergents which are stable to calcium or magnesium salts be used as a dyeing assistant. It follows that soap should not be used, because insoluble soap formations may result.

Again, in dyeing extremely dark shades on women's hosiery, this method of dyeing as well as color selection may be useful. In connection with this experimental work the figures expressed refer to only the dyestuffs and strengths as listed. Where higher or lower concentrations are encountered the saturation point would necessarily change, but for any dyestuff you might wish to evaluate you are again referred to Stott's work where the methods are clearly outlined.

Summary

1. Careful selection of dyestuffs is of major importance in dyeing nylon hosiery whether acid or acetate dyes are used. In addition, control of temperature and time have an important bearing on unions in cases where various types of nylon yarns are used in the same stocking. The ordinarily recommended temperature of 150° F. can be exceeded in dyeing these combinations, and any increase in temperature above 150° F. will result in easier levelling and a saving of time when acetate dyes are used.

2. For dyeing dark shades on nylon-cotton or nylon-rayon combinations the use of magnesium sulfate with acid colors generally yields greater color value without the hazards of an acid dye bath.

3. When two or more acid dyestuffs are used together to produce a given shade, selection of these dyes should be based on their behavior as to saturation point, speed of exhaust and relative neutral affinity.

Discussion

Mr. Walters: In regard to the low temperature of preboarding, there was no specific time cycle mentioned, and I wonder whether anyone had any idea on the proper time cycle for low temperature preboarding.

Chairman Siegrist: When you say low temperature, about what temperature are you thinking of?

Mr. Walters: Fifteen pounds steam pressure.

Chairman Siegrist: We find that a time of approximately a minute is giving us the best results at a pressure considerably higher, and I think that you would find that at fifteen pounds approximately a two-minute cycle would be best. But I would like some other opinions on that.

Mr. Olson: I don't think the time cycle is as important as the temperature.

Chairman Siegrist: In respect to preboarding as I understand it.

Chairman Siegrist: I think it is generally conceded that a very high temperature could use a shorter cycle, and vice versa.

Mr. Walters: Concerning the suggestion of 175-degree temperature of dyeing, we have found that especially in our type of work a temperature of 175 or 180 seems to cause more wrinkles than a temperature of 150 or 160. A certain per cent of redyes is allowed in order to have better quality hosiery in regard to wrinkles. If I can eliminate practically all wrinkles on 15 denier at 160 degrees, I sacrifice five per cent redyes in order to have good-looking hose; rather than to have wrinkles in everything at 175 or 180.

Chairman Siegrist: I don't think I quite understand. Are you talking about dyeing or preboarding temperatures?

Mr. Walters: I am talking about dyeing temperature, in regard to the 15 denier hose after they are dyed and finished.

Chairman Siegrist: Isn't it generally conceded that the differential between your preboarding or your setting temperature and your dyeing temperature is the important factor? If you preboard at 215 degrees, I don't think that you would have too good results dyeing at 200.

Mr. Walters: We don't have it on 30 or 40 denier, but it does pop up on 15 denier, or 15 mono-filament. The minute we step down the temperature, just not increase the temperature of 160 degrees, we don't entirely eliminate the wrinkles, but we do get a much better looking job.

Chairman Siegrist: When you dye at the low temperature you have more wrinkles than when you dye at the high, regardless of how you preboard them?

Mr. Walters: Regardless of how you preboard them.

A. W. Stout: I would like to ask Mr. Walters at what temperature he operates for preboarding.

(Concluded on Page P209)

Hosiery Group Meeting—

A Simple Tester for Evaluating the Snag Resistance of Nylon Hosiery*

J. EDWARD SMITH and THOMAS D. JOHNSON, JR.

Technical Laboratory, Organic Chemicals Department,
E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware

Abstract

A new, simple tester for evaluating the snag resistance of nylon hosiery is described in detail. A detailed procedure for using the snag tester and a comparison of results obtained by this new tester with other testers currently in use is given. Results obtained by the new test method are shown to correlate qualitatively with the performance of nylon hosiery in service tests.

The snag resistance of nylon hose is determined by observing the number of snags developed on nylon hose by drawing them over a rounded surface of sandpaper held by the tester. The snagged hose are given a light hand wash, and reboarded. The snags remaining after this second operation are classed as permanent distortions of the stitch. The effect of such factors as variation in curvature of the mounted sandpaper surface, rate of drawing the hose over the paper, and the grade of sandpaper used on the degree of snagging obtained is discussed. The method differentiates sharply between nylon stockings having excellent, fair and poor snag resistance.

It is believed that the best finishes for nylon hosiery are those which impart resistance to distortion of the stitch by increasing the coefficient of friction between the yarns and thus producing anti-slip properties at points of contact.

Introduction

THE purpose of this paper is to describe a simple laboratory tester for evaluating the snag resistance of nylon hosiery. Results obtained by use of this tester correlate qualitatively with the performance of hosiery observed in practical tests.

There are a number of physical properties that are related to the serviceability of hosiery. The methods listed by Schenke and Shearer *(1)* include resistance to snagging, resistance to abrasion, stretch and recovery, "distensibility", "recoverability", "stretch endurability", and bursting strength. Physical factors in hosiery yarns which can influence the above listed properties are coefficient of friction, abrasion resistance, tensile strength, and elasticity.

One of the most important physical properties to be considered in judging the serviceability of sheer nylon stockings is their snag resistance. A high degree of snag resistance is very important in protecting stockings during handling through the various inspection and packaging steps in a hosiery mill. Snag resistance is also of great importance in obtaining improved wearing properties since this factor is closely related to the incidence of runs in hose. In considering the cause of failure during wear, as determined from extensive wear tests, it was found that more runs are caused by snags than any other single factor. Schenke and Shearer *(1)* state that "Snags are a source of great complaint by wearers of hosiery. It is the nature of hosiery fabric to be more or less susceptible to snagging and snags soon lead to failure of a stocking".

Various methods have been considered in the past for obtaining comparative evaluations of the snag resistance of hosiery. The NAHM Snag Resistance Tester described by Shearer and Schenke *(2)* utilizes a smooth conical point as the snagging device. The conical point is moved by means of a micrometer screw through a hollow supporting disc to definite known distances below the base of the disc. The disc snagging mechanism is moved by means of a sliding carriage lengthwise of the stocking mounted on a form and the number of snags or holes developed at various micrometer settings are counted and considered in judging the comparative resistance of the stocking to snagging. A second type of tester *(3)* described by the United States Testing Company uses a needle in the form of a hook as the snagging device. The needle, attached to the end of an arm is placed in contact with a section of the stocking on a turn table. The weight required on the arm to cause the needle to snag the stocking, when the turn table is rotated, is used as a criterion by which the snag resistance of the hosiery fabric is judged.

In developing satisfactory snag resistance finishes for nylon hosiery it was advantageous to establish a simple, reliable procedure which can be run in a short time for evaluating the snag resistance of hosiery. Since a primary reason for applying a snag resistant finish should be to improve serviceability of the hose during wear, a satisfactory snag test method should provide results which correlate at least qualitatively with data on the performance of hosiery during wearing. The tester described in this paper has been useful and reliable in the evaluation of the snag resistant properties of hosiery over a period of years. Use of the test method expedited the development of a selected resin-type finish for nylon hosiery which has been shown by wear tests to improve the serviceability of nylon stockings.

The snag tester to be described in this paper utilizes a strip of sandpaper as the snagging surface. The selection of the snagging surface was based on a consideration of the type surfaces which produce distortions of the loops during wear. An analysis of the problem shows that surfaces which produce snags are usually characterized by roughness. While sand-

* Presented at Hosiery Group Meeting, E. J. Siegrist, Presiding, National Convention, Chicago, October 24, 1947.

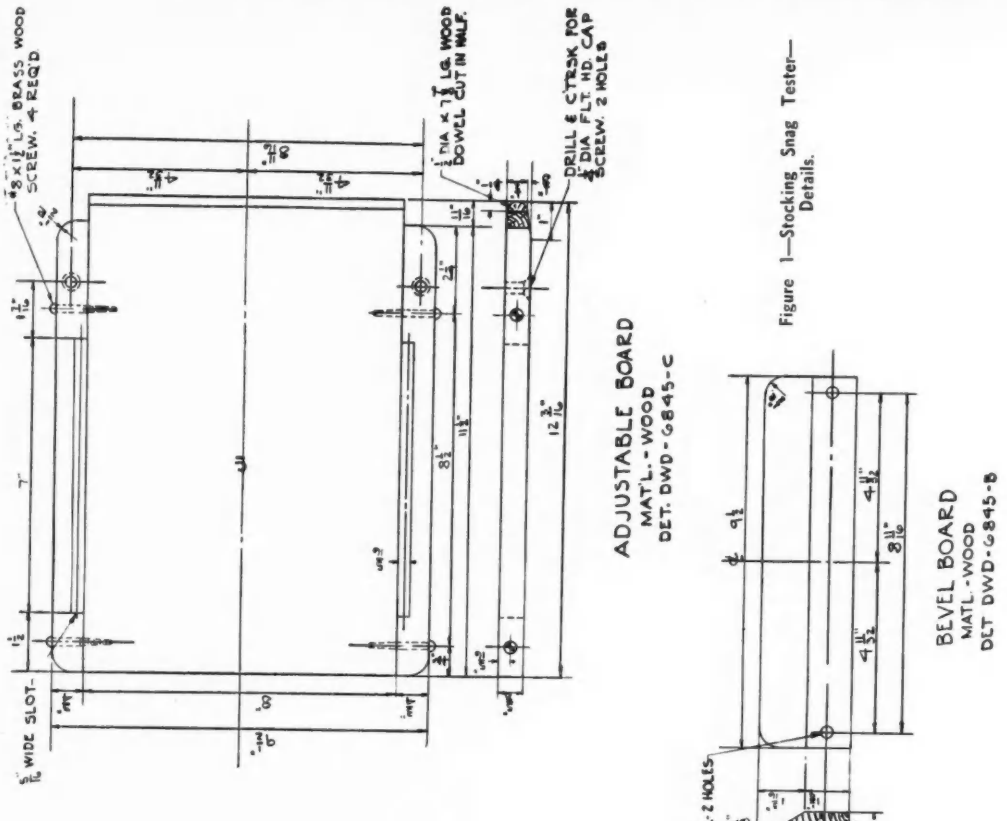


Figure 1—Stocking Snag Tester—Details.

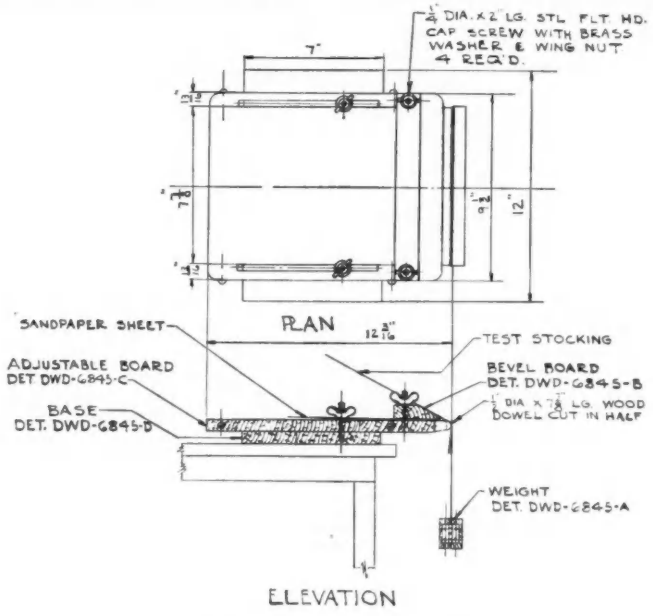

¼" DIA. X 2" LG. STL. FLT. HD. CAP SCREW WITH BRASS WASHER & WING NUT 4 REQ'D.
7"
12"
SANDPAPER SHEET
PLAN
12 3/16"
TEST STOCKING
ADJUSTABLE BOARD DET. DWD-6845-C
BEVEL BOARD DET. DWD-6845-B
½ DIA. X 7½" LG. WOOD DOWEL CUT IN HALF
BASE DET. DWD-6845-D
WEIGHT DET. DWD-6845-A
ELEVATION

Figure 2—Stocking Snag Tester—Assembly.

paper admittedly seldom is encountered by the wearer of hosiery, it was chosen to provide the snagging surface because it provides a reproducible, rough surface. By selecting the grade of sandpaper, the degree of roughness is controlled so as to produce distortions of the loops without tearing holes. Experience has shown that fairly uniform results are obtained from one sheet of sandpaper to another provided the paper is of the same grade from the same manufacturer. It is convenient in assessing the snag resistance of nylon hosiery to pull the stockings under tension over a section of the sandpaper supported by a rounded edge such as provided by a dowel stick of ½ inch diameter.

Description of Snag Tester

The laboratory snag tester described in this paper was developed to provide a device which makes it possible to mount sandpaper so that from 12 to 18 tests can be run on a single strip of paper. A detailed drawing of the snag tester is given in Figures 1 and 2. The snag tester, pictured in Figure 3, consists of the following parts:

(A) A wooden base of ⅝" plywood cut 12" wide and 7" deep. Projecting from the base as indicated are two flat-head screws.

(B) A slotted, adjustable wooden board resting on the base and held in position with wing nuts fastened onto the screws connected to the base and extending up through the slots. The board of 5/16" plywood, is 9½" wide by 11-11/16" in depth. Attached to the front of the board is a ½" diameter dowel stick, cut in half to supply a rounded surface. Projecting above the board are two flat-head screws as indicated.

(C) A wooden bevel board with a sloping front. The bevel board is clamped to the adjustable board with wing nuts fastened onto bolts projecting above the adjustable board and through the bevel board. The bevel board serves to hold the sandpaper in position and to provide a standardized angle to guide the passage of the test stocking over the sandpaper.

(D) Two flat wooden blocks 9/16" x 1½" x 8" held together at one end with a metal hinge and at the other end with a metal catch. The combined weight of the assembly is approximately 180 grams.

(E) 3/0 sandpaper. It is essential to standardize on a selected brand of paper since there is some variation between brands. We have standardized on Imperial Flint manufactured by Minnesota Mining and Mfg. Co., St. Paul, Minn.

Assembling of Snag Tester

The following steps are involved in assembling the snag tester for use:

(1) The base of the snag tester is clamped to a table so that its longer dimension is parallel and close to the table edge.

(2) A strip of sandpaper cut 7½" wide is attached face down on the front edge of the base with thumb tacks.

(3) The adjustable part of the snag tester is then placed on the base so that the bolts on the base project through the back end of the slots, and is secured with the wing nuts.

(4) The sandpaper is drawn over the rounded leading edge of the adjustable board and held tightly while the bevel board is bolted into position thus securing the sandpaper.

It is possible to make from 12 to 18 tests on a single strip of paper by changing the surface exposed after each test. This is accomplished by loosening the bevel board and adjustable board, then

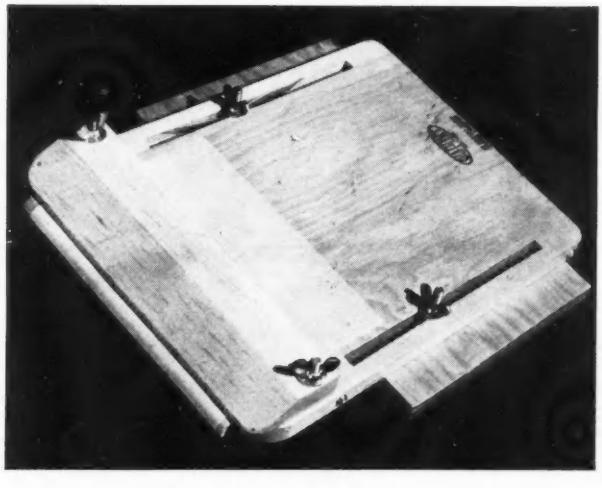


Figure 3—Stocking Snag Tester.

sliding the adjustable board backward about ½" after each test. The bevel board is of course fastened after each movement to hold the sandpaper tightly.

Procedure for Carrying Out Snag Test

The procedure for carrying out the snag test is as follows:

(1) An area on the boot about ½" below the shadow welt is marked on the hose by drawing two lines two inches apart and parallel to the shadow welt.

(2) The welt is clamped smooth and flat between the two wooden blocks. The fashion seam of a full fashioned hose forms one edge.

(3) The stocking is placed on the exposed curved edge of the sandpaper at the mark closest to the toe and with the blocks hanging toward the floor.

(4) The stocking is given a moderately rapid, steady horizontal pull back from the table edge over the bevel board so that the marked off portion of the hose is drawn vertically over the sandpaper.

(5) The wing nuts holding the bevel board and the adjustable board are loosened and the adjustable board is then moved backward. The sandpaper is drawn tightly over the edge, thus exposing a fresh surface of the sandpaper for the next test. All wing nuts are again tightened to hold the sandpaper firmly in position.

(6) The snagging action is repeated on the second side of the stocking.

NOTE: It is imperative that a new surface of sandpaper be used for each side of the stocking.

All marks on both sides between the two lines are counted without making any effort to grade the snags by types. Some of the marks which are counted in such a procedure will undoubtedly be abrasion marks rather than distorted loops as can be shown on close examination with a magnifying glass. In order to eliminate the abrasion marks and slight snags, the stocking is given a light hand wash at about 100-110° F. in a mild soap solution (about ¼ percent strength) followed by a rinse in warm water, after which the stocking is boarded on a heated metal hosiery form and the number of marks present are recounted. The marks remaining after the hand wash are permanently distorted loops representing snags which would be likely to cause trouble during wear. It is convenient to use a black painted, wooden hosiery form to support the stocking while counting snags.

TABLE I

Effect of Variation of Dowel Stick Radius on Snagging

	Snags for 22 sq. in. from							
	3/8 Inch Dowel				4/8 Inch Dowel			
Finish Code	Initial Snags	Av.	Permanent Snags	Av.	Initial Snags	Av.	Permanent Snags	Av.
No	205		160		196		140	
Finish	190	198	140	150	165	184	90	120
	200		150		190		130	
I	105	95	84	69	102	100	92	81
	84		54		98		70	
II	89	92	65	60	93	91	89	75
	95		55		89		60	
III	28	24	10	6	31	25	18	12
	21		3		19		5	
IV	25	27	12	7	18	19	13	8
	28		3		20		3	
V	4		2		3		1	
	2	3	1	1	3	4	1	2
	3		1		6		3	

Effect of Variation in Curved Surface on Snagging

The size dowel stick used to provide the rounded surface for supporting the sandpaper is not critical. The primary object is to provide a rounded surface which does not cause cracking of the sandpaper. The results obtained using a ⅜" dowel stick are essentially the same as obtained with a ½" dowel stick. Data to illustrate this point are given in Table I. In this table each figure represents the number of snags and marks counted initially and after laundering in an area of 22 sq. in. as described under the test procedure. Groups of stockings with various degrees of snag resistance are included in the table. The stockings were all 51 gauge, 30 denier taken from a single batch before finishing by different methods.

Effect of Variation in Grade of Sandpaper on Snagging

The grade of sandpaper used as the snagging surface has a pronounced effect on the depth of snagging and the number of snags formed. Grades of sandpaper which are suitable for use in this test are in the range 1/0 to 3/0. Coarser sandpaper usually tears holes in the sheer fabric of a nylon stocking. The relative effects of three grades of sandpaper on the degree of snagging are illustrated by the data contained in Table II. Each result given in this table is an average figure for 3 stockings and represents the average number of snags counted in an area of 22 sq. in. The stockings were marked before testing to block off 3 areas in sequence below the shadow welt. In running the tests, areas were chosen so that, with each grade of sandpaper, a different area was tested in going from one stocking to another.

The results show that, in general, the coarser the sandpaper, the greater the degree of snagging. Observation of the hose showed that the depth of snagging is also greater as the coarseness of the sandpaper increases.

Duplicability of Test and Interpretation of Data

A primary consideration in the development of the sandpaper test method was simplicity in construction of the tester and ease of performing the test. The degree of duplicability of the test, from stocking to stocking, is known to vary considerably as is illustrated by the data for individual stockings in Tables I, II and III. Part of this variation could be caused by differences in the rate that stockings are pulled over the sandpaper by the operator. Tests have shown that the rate of travel of the stocking over the sandpaper can vary at least 100% without markedly changing the results. The possibility of error from this source could of course be eliminated by a more elaborate set-up involving a carriage driven by a

TABLE II

Relation Between Snagging and Coarseness of Sandpaper

	No. of Snags for 22 square inches											
	3/0				2/0				1/0			
	Initial Count	Av.	Permanent Snags	Av.	Initial Count	Av.	Permanent Snags	Av.	Initial Count	Av.	Permanent Snags	Av.
No Finish	244		202		439		360		626		457	
	189	218	170	180	515	466	404	368	559	597	405	452
	221		168		443		339		605		495	
Finish D, 2%	118		63		257		164		358		209	
	78	105	37	57	355	267	174	143	186	245	129	144
	118		70		190		91		190		95	
Finish D, 10%	19		4		69		12		116		15	
	13	16	4	4	85	56	6	7	110	90	29	16
	15		4		15		2		45		5	

constant speed motor to draw the stocking over the sandpaper. The differences are more likely to be caused by variations in the fabrics from stocking to stocking. Differences also occur in testing sections of the same stocking and it appears advisable to make comparisons between stockings on the basis of corresponding areas.

The method described in this paper does differentiate sharply between nylon stockings having excellent, fair, and poor snag resistance as has been shown by experience in this laboratory for a number of years. In interpreting results emphasis is placed on the "permanent snags," remaining after the rinse, rather than the initial count. The results can be expressed in terms of snags for the measured area of 22 square inches or as snags per square inch. Untreated nylon hose constructed with either 30 or 40 denier yarn in the boot usually develop from approximately 120 to 350 snags for a 22 square inch area or from approximately 6 to 16 snags per square inch, against 3/0 sandpaper. A stocking showing no more than 11 snags for 22 square inches or 0.5 snag per square inch in the same test is considered to have excellent snag resistance. The difference in the test results obtained between hosiery of low and high snag resistance is so great that the variations in individual determinations become of no consequence in terms of establishing a correct rating of performance. While intermediate degrees of improvement in snag resistance can be detected between untreated and highly snag resistant hose, it is believed that emphasis should be placed on obtaining high snag resistance to provide maximum protection and service rather than to establish a scale of intermediate grades.

Comparison of Snag Test Methods and Relation to Wear Tests

The ultimate value of any proposed method for evaluating the snag resistance of hosiery depends on its correlation with hosiery serviceability during handling and wearing. The following experimental work was carried out to establish the relationship between results obtained with the Sandpaper Tester, the "NAHM" Snag Tester and the United States Testing Company Tester to wear tests of hosiery in actual service.

The study was carried out on 51 gauge, 30 denier nylon hosiery finished as follows:

(A) No finish.

(B) Commercial splashproof type such as used widely in finishing silk and rayon hosiery.

(C) Combination resin and wax finish.

(D) Resin finish, especially selected to produce high snag resistance on nylon hosiery as judged by the sandpaper type tester.

TABLE III

Summary of Wear and Snag Test Data

Treatment	*No Finish*	*Finish B*	*Finish C*	*Finish D*
		Wear Test Report		
Average Wear				
Days	23	24	26	30
Hours	339	344	314	404
Snags/100 hours	13.0	14.3	15.1	9.5

Snag Test Data by Sandpaper Method Per 22 Square Inches Using 3/0 Sandpaper

Snags		*Av.*		*Av.*		*Av.*		*Av.*
Initial Count	329, 397 240, 292	314	361, 271 246, 345	306	190, 135 158, 156	160	62, 36 57, 39	48
Permanent Snags	246, 248 167, 164	206	196, 181 179, 230	197	91, 65 93, 92	85	7, 1 2, 6	4

Data by United States Testing Company Snag Detector

Snag Factor	36.9	35.5	35.0	36.3

"NAHM" Snag Test Report

Penetration of Snagger				
0.004 in.	Contact	Contact	Contact	Contact
0.006	18 light snags	4 light snags	7 light snags	4 light snags
0.008	72 light snags— 1 hole	47 snags	16 looped snags	25 snags—6 holes
0.010	27 looped snags— 6 holes	37 looped snags— 1 hole	35 looped snags— 7 holes	14 looped snags— 39 holes
0.012		31 looped snags— 7 holes		
Snag Index	10	11	10	9

Twenty-five pairs from each of the above sets of stockings were worn by girls working in an office building. The stockings were inspected daily and were worn until one of each pair failed by developing a run. The number of snags present in the stockings was determined from day to day to observe the rate of snagging. The length of wear was reported in terms of total days and total hours.

Tests for snag resistance on stockings taken from the different batches of hose were made as follows:

(a) Four stockings from each batch were subjected to the sandpaper type tester using 3/0 sandpaper by the procedure given in this paper.

(b) Four disc sections from each of three stockings from each batch were tested with the turn table type Snag Detector *(3)*. In this test a metal hook is pressed onto a section of the stocking stretched over a rotating disc. The hook is mounted on the end of a metal arm carrying a rider. Pressure on the hook is increased by moving the rider along the arm until snagging occurs and the weight required is recorded.

(c) Two sides of each of three stockings taken from each batch were tested with the "NAHM" Snag Resistance Tester following the directions given in Letter Circular LC-588 of the United States Department of Commerce, National Bureau of Standards *(2)*. In this test the snagging mechanism is a metal needle which is essentially a smooth conical point. The needle is mounted in a hollow supporting disc and can be lowered to known distances below the surface of the disc by means of a micrometer. The stocking is mounted on a metal form containing a hollow section in which can be inserted a strip of paper to back the fabric of the hose. The snagging mechanism is moved lengthwise along the stocking by means of a carriage. The needle is lowered in steps of 0.002 inch. The number and types of snags formed at different levels of penetration are counted and penetration continued until more than one hole is formed. The snags are classified on the basis of light snags, snags, looped snags and holes. For purposes of comparison the defects are converted to the predominant type at each level of penertation on the basis of two light snags being equivalent to one snag, two snags the equivalent to one looped snag and three looped snags the equivalent of one hole. The ease of snagging is rated on the basis of the predominant type snags produced at different levels. The "Snag Index" or level of penetration required to produce holes is taken as representative of resistance to destructive snagging. A high index number is said to be desirable.

The data obtained from the wear tests and different snag tests are summarized in Table III.

The data in Table III show that the results obtained for snag resistance with the sandpaper type tester correlate qualitatively with the performance of the stockings in wear tests as juged by rate of snagging and days of wear before failure. There is a large difference in snag resistance between stockings treated with Finish D and the untreated or those treated with

Finish B and C. The snag test data indicate that there is little difference between Finish B and no finish and the wear tests likewise show little difference. Finish C is indicated by the snag tests to be intermediate to Finish D and no finish. The wear tests show Finish C to be intermediate to Finish D and no finish in terms of days but not in terms of hours. Finish D, which the tests show has a high snag resistance, improves wear so that the stockings wore 30% longer in terms of days and snag at about 75% the rate of the untreated. The improved wear obtained with Finish D naturally depends not only on having high snag resistance initially but also on some degree of durability during wear.

The data obtained by the use of the "Snag Detector" do not show any substantial difference between the four batches of hosiery.

The data obtained with "NAHM" Snag Tester indicate that Finish D is the poorest since the "Snag Index" is lowest and that Finish B produces superior snag resistance. These deductions do not correlate with the performance judged by wear tests and are the opposite to those obtained with the sandpaper type tester.

It is apparent from the data summarized in Table III and the conclusions which can be drawn that the sandpaper type tester described in this paper differentiates between stockings to the greatest degree and correlates with actual performance as judged by wear tests.

Sandpaper Test Method Related to Selection of Knitting Sizes and Finishes for Nylon Hosiery

The sandpaper method for judging snag resistance described in this paper was developed in a program carried out to develop finishes for nylon hosiery which had improved snag resistance. The improved snag resistance was urgently needed to minimize seconds from handling in the mills, to eliminate pulled threads during merchandising and to give better resistance to runs developed from snagging during wear.

As pointed out earlier, there are a number of tests for judging the performance of hosiery. Physical factors which enter into satisfactory performance in these tests include tensile strength, abrasion resistance, coefficient of elasticity, and the coefficient of friction. The high abrasion resistance, elasticity, and tensile strength of nylon make this product of unusual interest in the fabrication of sheer fabrics and hosiery.

In early experimental work, it was observed that nylon hosiery were much more susceptible to snagging during manufacture than silk hosiery. The natural protective coating of sericin on silk made this fiber relatively easy to handle. On the other hand, unusual precautions were required in handling nylon in the mill to avoid seconds because of pulled threads. Nylon hosiery finished with the type finishes being employed on other fibers were susceptible to snagging during handling, merchandising and wearing. Snagging caused failure in silk stockings quicker than in nylon. The longer life of nylon hose made it appear that they snagged worse than silk hose because the greater number of exposure hours provided a greater opportunity to develop a greater total of snags.

Consideration of the problem of poor snag resistance led to the conclusion that a number of factors were responsible for the difficulties encountered. Nylon yarn is smoother than the silk yarn employed in the hosiery industry and this difference is accentuated in many instances by the use of higher twist for the silk. The lower coefficient of friction between nylon yarns at points of contact leads to increased susceptibility to slippage when a distorting force is applied. The nylon stockings originally introduced to the trade corresponded to a 3-thread silk stocking. The high tensile strength and abrasion resistance of nylon later has led to some manufacture of even sheerer stockings. The use of finer denier yarns accentuates the snagging problem.

Since a snag is formed by distortion of the stitch on contact with a surface which exerts a pull on the yarn, it is obvious that snagging is related to the coefficient of friction. There are two possible approaches to modify frictional characteristics. One approach is to apply materials to increase the coefficient of friction between the yarns at point of contact so that increased force is required to produce distortions. A second approach is to apply materials which lubricate yarns so that contacting surfaces slide off the yarns before distortion of the stitch occurs. Since the lubricating type finishes used for silk and rayon hosiery did not serve to protect nylon stockings from snagging during handling, and since nylon yarn is quite smooth, it appeared that the snagging problem on nylon would be solved primarily by the first approach of increasing the coefficient of friction between yarns.

The use of sandpaper as a snagging surface provides a method for engaging the stitches of a knitted sheer fabric to a degree that can be controlled by the coarseness of the grains. The grains on the paper are not so sharp as to cut the fabric and holes are produced only when the penetration of the stitch is so great that the threads are firmly engaged and break. The first use of sandpaper was in selecting knitting sizes for nylon yarn. Sizes which, when applied to nylon yarn, led to production of a grey hosiery fabric which was markedly improved in resisting the snagging action of sandpaper, also were found to reduce seconds in the knitting operation and to reduce snagging during the handling of the knitted fabric. Following this observation the tester described in this paper was devised and used in selecting finishing materials to be used in the final finish after dyeing to increase resistance to snagging during inspection, packaging, merchandising and during wear. Practical experience again has shown that stockings which are finished to obtain a high degree of snag resistance as judged by the sandpaper method are more resistant to snagging under the conditions listed above.

The correlation of the sandpaper method for evaluating the snag resistance of nylon hosiery with practical performance in selecting satisfactory knitting sizes and final finishes demonstrates the basic soundness of this method.

The importance of using finishes on nylon hosiery which increase the snag resistance is readily seen. It is true that the use of lubricating type finishes which decrease the coefficient of friction of nylon will produce a hosiery fabric that may perform even better than untreated nylon in tests which measure resistance to abrasion and flexing. However, nylon has such superior abrasion resistance inherently that this improvement is without purpose when it is accomplished at the expense of snag resistance. The property in nylon hosiery which is in greatest need of improvement from a finish is snag resistance and the best serviceability in nylon hosiery will be accomplished by using finishes which increase rather than decrease the coefficient of friction of the nylon yarn.

References

(1) H. E. Shearer and E. M. Schenke: "The National Association of Hosiery Manufacturers" "'NAHM' Snag Resistance Tester", Letter Circular LC-588, April 6, 1940.

(2) E. M. Schenke and H. E. Shearer: "Methods of Testing Hosiery", pp. 12-13, Circular C-422, July 16, 1938, U. S. Department of Commerce, National Bureau of Standards, Washington, D. C.

(3) United States Testing Company, Life Magazine, Vol. 8, No. 24, p. 61, June 10, 1940.

Discussion

Mr. Walters: In regard to the coefficient of friction, would that refer to the extensibility and the recoverability of the finish?

Dr. Smith: No. That wouldn't be related to the frictional characteristics.

Mr. Walters: Well, would the type of tester that you described relate to whether the finish had different properties of

extensibility and recoverability after being applied.

Dr. Smith: I think that actually there is very little relation. That is, finishes can be selected which have very little influence on extensibility and recoverability and which will still produce an increased coefficient of friction on nylon yarn.

Mr. Fancourt: Dr. Smith, does the humidity have any effect from day to day on your test, so far as you have found?

Dr. Smith: I believe not. We have never run the test under conditions of controlled relative humidity, but we have had occasion to run the test in South Jersey both summer and winter, so we have had quite a lot of fluctuation in humidity but we get about the same type of results from day to day or month to month.

Mr. Olson: I would like to have you, if you will, explain how you count the snags. In other words, after pulling it over this sandpaper you will find probably snags that are very, very close together. Would you count that as two, or would you count it as one, especially on a stocking?

Dr. Smith: If we can actually see any difference between the marks, we count the total number there are even if there are a nest of them. In fact, on that stocking which is going around I think there are sections on it which have half a dozen snags at one point. So we count as many as we think we can find. We don't try to classify a group as one.

Mr. Virkler: Do you have any standard on 15, 20, and 30 deniers, as far as the snag resistance values are concerned?

Dr. Smith: We haven't tried to set up any standard for snag resistance for the trade. Actually, I think that a good degree of snag resistance, that is performance comparable to that on the 30 denier hose, can be obtained on the 15 and 20 deniers.

Mr. Virkler: Your mono-filament is much harder to snag than, say, your 20 denier multi-filament?

Dr. Smith: It is easier to snag the 20 denier. That is the toughest stocking to make snag resistant.

Mr. Virkler: Would you use the same weight on that as you would on the 30 denier, or don't you think the weight should be correspondingly less than it would be for the 30 denier?

Dr. Smith: That is possible. Actually, differentiation can be shown on the 20 denier stockings with that weight, but we may not have the best possible weight there. We haven't done any experimentation with other weights. That particular one was selected not very scientifically. We started out with the idea that we wanted an assembly which would provide tension and hold the stocking out flat. This is the first one we made. It worked very well, and we have just used it ever since.

Mr. Boyd: Does the United States Testing House or any other organization recognize that means of testing?

Dr. Smith: I wouldn't want to speak for the United States Testing Company or the other testing houses.

Mr. Boyd: Do they refer to it or in any way indicate their opinion of it?

Dr. Smith: That I don't know. I do know that some of the testing houses have had these snag testers, but just what they are doing with them I don't know, frankly.

Mr. Walker: Dr. Smith, have you performed any experiments to see what effect on that particular instrument different preboarding temperatures and cycles have upon the finish and the snags?

Dr. Smith: No, we haven't made any study of that sort.

Chairman Siegrist: You speak of the coefficient of friction, and it seems to follow fairly clearly that it has something to do with snagging. I would say therefore, that for any given yarn, for example, 20 denier, an increase in twist would increase your coefficient of friction.

Dr. Smith: It should do that.

Chairman Siegrist: Yet in the 15 denier I think it is generally conceded that they snag less easily than the 20 denier.

Dr. Smith: Do you think that may be associated with the difference between a multi-filament and a monfilament yarn? I think that is a primary factor. I think the multi-filament yarn, by the actual construction, snags more readily than the mono-filament.

Chairman Siegrist: For example, with an untwisted yarn, if you attempt to oil it you actually create friction; so I was trying to tie up this point of lubricity with snag resistance, and there are some questions there that would probably take a lot of answering.

Dr. Smith: They might very well.

Mr. Virkler: Is there any way of determining whether sandpaper will be uniform? I mean will pieces vary noticeably?

Dr. Smith: There might be some significant variation in sandpaper made by different companies. We have standardized on one brand and used it for a number of years. In our experience with it, we get substantially the same results with paper from different packages.

Mr. Virkler: Do you have the same operator pull the stocking on each test? What happens if you change operators?

Dr. Smith: They were all run by Mr. Johnson. We had only the one operator run the test.

Mr. Virkler: Would there be a difference if I pulled it and you pulled it, not at the same speed or the same angle?

Dr. Smith: Let us start with the angle first, because we have the answer to that one. As I run the test, you see as I have this stocking hanging over the end of the tester, the angle is fixed by the bevel board.

Mr. Virkler: I have seen them stand around in front, in one case that I know of. Somebody had better show them the correct way to do it.

Dr. Smith: The correct way of running the test is the way I have described it here this afternoon. If any operator insists on standing in front and pulling the stocking up without reference to this bevel board, there is going to be a difference in the results, without a doubt. The test must be run in a standardized manner.

As far as the rate of pull is concerned, if you vary that very widely you will get different results. In other words, if you pull the stocking back saying, "Please don't snag, let's go very gently here and not hurt you," then it is not going to work. But if you say: "Come on, *snag!*", and give it a good pull, you will get more snags. But as long as you give it a brisk pull you can vary that pull quite a little and get about the same differentiation.

Mr. Virkler: Do you actually think you would get the same results if you jerk it at different rates?

Dr. Smith: No. I am giving it what I am calling a brisk pull. I don't like the term "jerk."

Mr. Virkler: That is what they do, Dr. Smith.

Dr. Smith: If someone will hold this tester I will show you what I consider to be a satisfactory pull, like this, brisk. You could conceivably pull it a whole lot slower.

Mr. Olson: Dr. Smith, did you mention about changing the sandpaper? How often do you do that?

Dr. Smith: I forgot that point, and that is a very important one. We change the sandpaper after every travel of the stocking over the surface of the sandpaper. In other words, after you have dragged your stocking over here once, the surface is changed, so that you must change the sandpaper. This is fixed up so you can do it very simply after each pull of the stocking over the sandpaper.

Another important thing which occurs to me at the same time, and which I believe I skipped, is that it is important to start with the board well forward. At least we think it is important, because conceivably you have a little pressure here from this bevel board down on the sandpaper, and it is going to push in the grains a little bit. We want to do everything possible to keep from changing the surface of that paper, and therefore try to run the test so that the paper actually doesn't come under the bevel board until after it has been used. Of course at the start there is a certain section there that

(Continued on Page P209)

A Quantitative Test Method for Evaluating Wool Scouring Detergent Systems*

E. A. LEONARD** and A. R. WINCH

Product Engineering Laboratories, Alexander Smith & Sons Carpet Company

I. Foreword

THEORIES generally advanced in reference to wetting and detergency indicate that the process is accomplished by a combination of several complex actions *(1, 2, 3, 4)*† which are, in turn, sensitive to a number of variables. Many tests *(5, 6)* have been proposed for measuring scouring potentialities of detergents. Unfortunately, most of these tests measure individual properties which may be indicative but not conclusive evidence of good detergent potential. Most detergents have good surface tension lowering properties, good wetting power, often—but not always— good foaming power, emulsifying power, dispersion power, etc. A correlation of these various factors to give a qualitative evaluation of scouring potential is difficult.

Laundering artificially-soiled pieces of cloth eliminated the necessity for correlating the above-mentioned factors and promised to give an immediate qualitative answer. However, some difficulty has been experienced *(7)* in obtaining reproducible results with Launderometers.

II. General Method of Test

A good quantitative test method for evaluating detergents should indicate the relative cost per pound of material cleaned for the various detergents. The test method outlined below has proved highly satisfactory for that purpose. A series of tests will indicate the optimum conditions under which given detergents should be used. Then the detergents can be compared under their individually optimum conditions from the standpoint of cost per pound of wool scoured within specified control limits for residual grease or dirt. The detergent systems can also be checked at the same time for critical factors of control.

A small laboratory scouring train is used, under controlled conditions, to scour uniform skeins of wool uniformly soiled. In one trial a series of skeins is scoured, the skeins following one another consecutively in the same detergent system. The residual grease content of each skein is than plotted against the cumulative weight of wool scoured. This method yields reproducible characteristic scouring curves. The test apparatus may be flexible or rigid, simple or complicated, depending on the needs and resources of the investigator.

In line with the experience of other investigators, the criteria for reproducible, significant results are:

(A) All factors known or believed to affect scouring efficiency should be subject to control where possible, for example:
  (1) Detergent used.
  (2) Concentration of active detergent.
  (3) Temperature of scouring liquors.
  (4) Length of time soiled material is subjected to action of detergent solution.
  (5) Circulation of scouring liquors.
  (6) Mechanical agitation of material being scoured.
  (7) Wringer pressure.
  (8) Concentration of supporting electrolytes, specific ions,; other salts, and dirt build up.
  (9) pH.
  (10) Ratio of soiled material to scouring liquor.

(B) The material to be scoured should be in a uniform state of physical and chemical aggregation with a uniform state of soil.

(C) The conditions noted in (A) and (B) above should approximate, as closely as practicable, the actual conditions under which mill production must function.

The following specific example of application of the above principles, with the resulting data and scouring curves for the systems investigated, shows what has been done by this method of evaluation and indicates the potentially valuable information which may be obtained by further investigation.

III. Nature of the Scouring Problem

One of the detergent problems faced at the Alexander Smith & Sons Carpet Company is the scouring of raw grease wool prior to the carding, spinning, and dyeing operations. Wool enters the Smith plant in a state similar to that on a sheep's back. It contains natural wool grease (lanolin), vegetable matter, sand, and (in the case of pulled wod) lime. Most of the dirt is removed by the opening and dusting process which separates the larger clumps of matted wool into a fluffier open state permitting the heavier dirt to drop out. Most of the grease, along with the remaining fine particles of soil, is then removed in the grease wool scouring operation. It is desired to obtain wool uniformly clean between specific limits as economically as possible.

The grease wool is scoured in a four bowl train; the first bowl, used for steeping and de-suinting, contains initially plain water; the second and third bowls contain alkali and soap solutions; the fourth contains rinse water. Wool is fed through the train from one bowl to another by a system of rakes and conveyors. A period of approximately 30 seconds is required for the wool to travel the length of each bowl, after which it passes through squeeze rolls into the next bowl. The wringer liquor from the wool leaving the final (rinse) bowl is returned to the first (suint) bowl. The wringer liquors from the other bowls are returned to the bowl from which the wool is emerging. The temperature of all bowls is held at 140° F.

IV. Specific Application of Test

In an attempt to study the grease wool scouring process used in the mill, and to evaluate various detergent systems which could be used in this process, a laboratory scouring train was assembled with readily available materials.

Stainless steel beakers (4 liter capacity)

* Presented at Meeting of New York Section, December 5, 1947.
** Assistant Chief.
† Numbers in brackets indicate references.

were used as scouring bowls. A deep tub laboratory sink filled with water was used as a constant temperature bath. The temperature of the bath was raised and maintained at 142° F. ± 1° by means of two 1000 watt immersion heaters. A small electrically-driven propeller circulated the water bath around the stainless steel beakers and held the scouring liquors at 138° F. ± 2°. An ordinary household laundry hand wringer with a specially made Monel metal drain board, rubber hose attached, was used to approximate the mill squeeze roll action between bowls. The feed back of wringer liquors was easily accomplished by switching the rubber hose from one bowl to the next as each skein of wool progressed through the scouring train.

A long fluorescent lighting tube was mounted horizontally on two large ringstands with standard laboratory clamps in such a manner that it straddled the water bath. A small clamp with rubber covered jaws attached to one end of the tube served as a hand crank to rotate the tube back and forth through a small angle about the axis of the tube. Suspended from this horizontal glass tube were 4 hooks made of ¼ inch glass rod. These glass rod hooks were fastened to the fluorescent tube by means of a system of laboratory clamps and clamp holders in such a manner that the hooks could be moved down and up, lowering or raising the skeins into or out of the scouring bowls at the beginning or end of a 30 second pass through the bowls. Each skein passed successively through each bowl with one pass through the wringer between bowls. As the first skein left the 4th (rinse) bowl, the 2nd skein left the 3rd (alkali) bowl, while the 3rd and 4th skeins trailing along left the 2nd and 1st bowls respectively. Time of immersion was 30 seconds per bowl. Mechanical agitation consisted of an easy back and forth movement of skeins in the bowls as the glass hooks moved with the manual rocking of the fluorescent tube, 50 half strokes in 30 seconds. The timing and mechanical agitation could probably be motorized for better uniformity of control.

Wringer pressure was held constant by setting the hand screw on the spring bar a fixed number of turns from the collar. This could probably be subjected to finer control by means of a more elaborate wringer especially designed for sensitive pressure control.

The natural soil conditions of raw grease wool were easily approximated by carding and spinning the grease wool before scouring. Although the carding operation removed some of the grease and dirt, a great advantage was realized in obtaining a natural grease yarn of uniform grease, ash, and lime content. Approximately 40 five-gram skeins were obtained from each spool of yarn by measuring uniform lengths of yarn under uniform tension and winding them up on a small hand reel. Six random skeins from each spool were weighed, and the average of the six used as the weight of each skein on a given spool. Measuring and weighing of the yarn was done under standard conditions of atmospheric temperature and humidity.

After scouring, the skeins were dried overnight at 150° F, and residual grease content of each skein was determined by rapid extraction with carbon tetrachloride in a device called the "Greaseometer", manufactured by the American Chemical Paint Company. In this method of extraction the 5-gram skeins were placed in small brass cylinders and squeezed by hand with a piston in a measured volume of carbon tetrachloride in a prescribed uniform manner, after which an aliquot portion of the carbon tetrachloride with its dissolved grease and suspended dirt particles was evaporated to dryness in tared aluminum dishes under infra-red radiation lamps. A special jig was used with the "Greaseometer" so that six grease extractions could be run simultaneously. Although "Greaseometer" extractions do not give true values of residual grease content, the values obtained are proportional to the results obtained by standard ASTM ether-alcohol soxhlet extractions.

The time required to run a scouring trial of 78 skeins was approximately five hours. These skeins were extracted on the "Greaseometer" and the resulting curve plotted in an eight hour day. One-half day was required to make up the skeins and spot check the weight. Total time required to obtain a full scouring curve was from two to two and one-half days. However, preliminary screening tests in which only 6, 12, or 18 skeins are run will give short curves which should suffice to give a general indication of scouring trends. Using the short curves as a guide, only the more promising systems need be given the more lengthy full scouring curve study.

V. Test Results

In trials I through V (see charts for scouring curves), the initial concentration of soap and alkali was 0.90% soda ash, 0.30% sodium metasilicate, and 0.036% tall oil soap. In trial I 1500 ml. of this scouring liquor was charged into each alkali bowl (bowls 2 and 3) for a total of 3000 ml. of scouring liquors containing 27 grams of soda ash, 9 gm. sodium metasilicate, and 1.08 gm. of soap which scoured 93 grams of wool, within the control limit of 1.3% residual grease. Trial II was similar to trial I except that a full charge addition of 27 grams soda ash, 9 gm. sodium metasilicate and 1.08 gm. of soap was added (in the form of concentrated solutions so that the total volume of wash liquors was not materially affected) after 90 grams had been scoured. The scouring curve clearly shows that the additional charge was much more effective than the initial charge.

Since it was desired to investigate the load carrying capacity and the effect of additions of alkali and soap, the total volume of alkali-soap liquors was reduced from 3000 to 2000 ml. to shorten the test in trial III. The initial charge in trial III therefore contained only 2/3 the amount of alkali and soap of trials I and II, al-

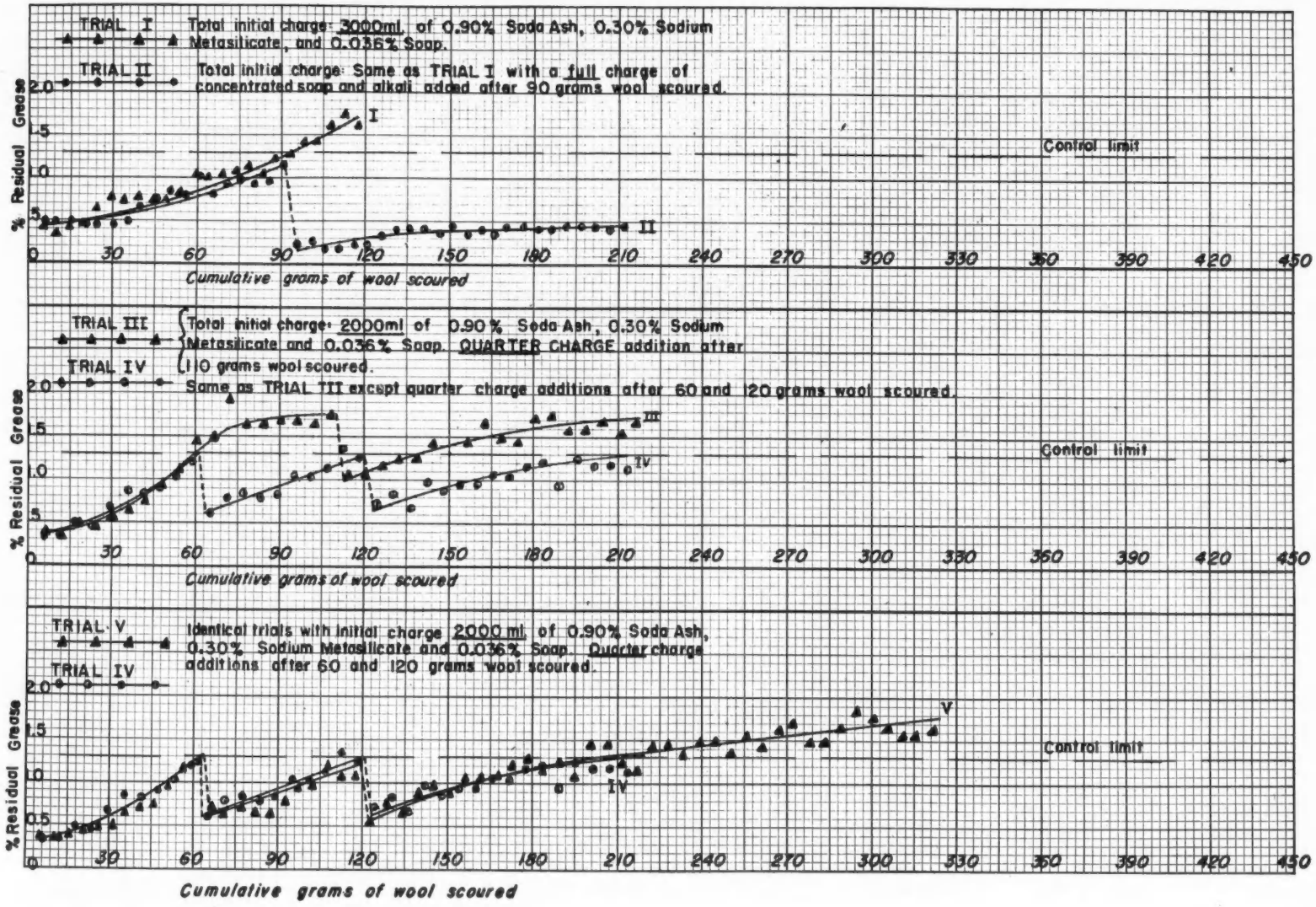
TRIAL I

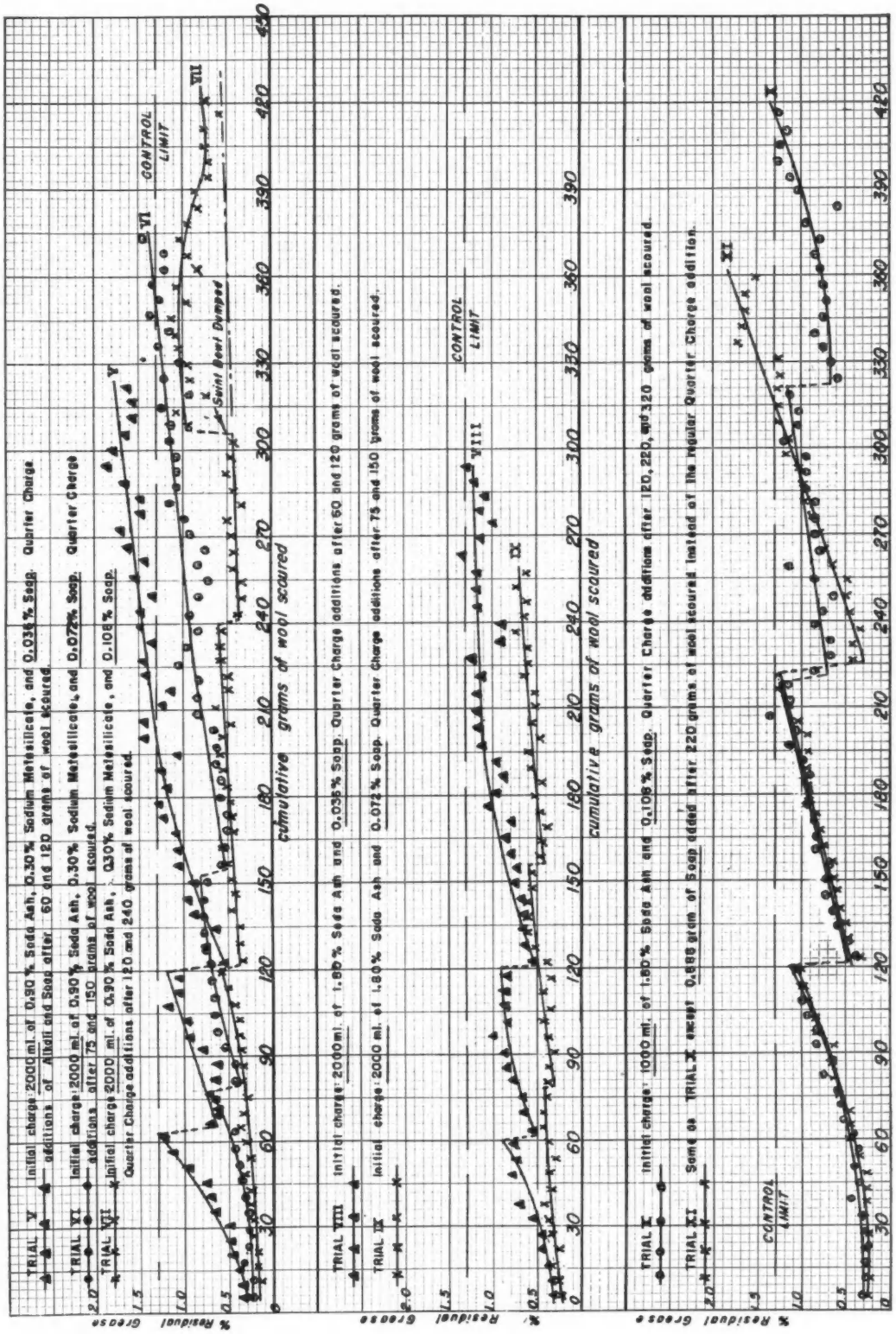
Cumulative Weight (gm.)	*Residual Grease Content—%*
4.9	0.41
9.8	0.36
14.7	0.41
19.6	0.46
24.5	0.64
29.4	0.77
34.3	0.73
39.2	0.77
44.1	0.73
49.0	0.73
53.9	0.82
58.8	1.05
63.7	1.00
68.6	1.05
73.5	1.09
78.4	1.14
83.3	1.05
88.2	1.23
93.1	1.28
98.0	1.41
102.9	1.41
107.8	1.60
112.7	1.73
117.6	1.60

TRIAL II

Cumulative Weight (gm.)	*Residual Grease Content—%*
5.0	0.49
10.1	0.49
15.1	0.49
20.2	0.44
25.2	0.44
30.2	0.44
35.3	0.49
40.3	0.66
45.4	0.75
50.4	0.85
55.4	0.80
60.5	1.02
65.5	0.80
70.6	0.93
75.6	0.97
80.6	0.93
85.7	0.97
90.7	1.15
95.8	0.22*
100.8	0.27
105.8	0.18
110.9	0.18
115.9	0.22
121.0	0.22
126.0	0.31
131.0	0.40
136.1	0.40
141.1	0.40
146.2	0.35
151.2	0.44
156.2	0.35
161.3	0.40
166.3	0.35
171.4	0.44
176.4	0.44
181.4	0.40
191.5	0.40
196.5	0.44
201.6	0.44
206.6	0.44
211.7	0.40
216.7	0.44

* Full charge addition of soap and alkali.


TRIAL I
Total initial charge: 3000ml. of 0.90% Soda Ash, 0.30% Sodium Metasilicate, and 0.036% Soap.
TRIAL II
Total initial charge: Same as TRIAL I with a full charge of concentrated soap and alkali added after 90 grams wool scoured.
% Residual Grease
Control limit
Cumulative grams of wool scoured
TRIAL III
Total initial charge: 2000ml of 0.90% Soda Ash, 0.30% Sodium Metasilicate and 0.036% Soap. QUARTER CHARGE addition after 110 grams wool scoured.
TRIAL IV
Same as TRIAL III except quarter charge additions after 60 and 120 grams wool scoured.
% Residual Grease
Control limit
Cumulative grams of wool scoured
TRIAL V
Identical trials with initial charge 2000 ml. of 0.90% Soda Ash, 0.30% Sodium Metasilicate and 0.036% Soap. Quarter charge additions after 60 and 120 grams wool scoured.
TRIAL IV
% Residual Grease
Control limit
Cumulative grams of wool scoured


TRIAL V Initial charge 2000 ml. of 0.90 % Soda Ash, 0.30% Sodium Metasilicate, and 0.036% Soap. Quarter Charge additions of Alkali and Soap after 60 and 120 grams of wool scoured.
TRIAL VI Initial charge 2000 ml. of 0.90% Soda Ash, 0.30% Sodium Metasilicate, and 0.072% Soap. Quarter Charge additions after 75 and 150 grams of wool scoured.
TRIAL VII Initial charge 2000 ml. of 0.90 % Soda Ash, 0.30% Sodium Metasilicate, and 0.108% Soap. Quarter Charge additions after 120 and 240 grams of wool scoured.
CONTROL LIMIT
Saint Bowl Dumped
% Residual Grease
cumulative grams of wool scoured
TRIAL VIII Initial charge 2000 ml. of 1.80 % Soda Ash and 0.036% Soap. Quarter Charge additions after 60 and 120 grams of wool scoured.
TRIAL IX Initial charge 2000 ml. of 1.80% Soda Ash and 0.072% Soap. Quarter Charge additions after 75 and 150 grams of wool scoured.
TRIAL X Initial charge 1000 ml. of 1.80 % Soda Ash and 0.108% Soap. Quarter Charge additions after 120, 220, and 320 grams of wool scoured.
TRIAL XI Same as TRIAL X except 0.888 grm of Soap added after 220 grams of wool scoured instead of the regular Quarter Charge addition.

TRIAL III

Cumulative Weight (gm.)	Residual Grease Content—%
6.0	0.37
12.0	0.33
18.0	0.48
24.1	0.44
30.1	0.55
36.1	0.63
42.2	0.74
48.2	0.92
54.2	1.11
60.3	1.44
66.3	1.48
72.3	1.92
78.3	1.63
84.4	1.63
90.4	1.67
96.4	1.67
102.5	1.63
108.5	1.74
114.5	1.04*
120.5	1.04
126.6	1.15
132.6	1.22
138.6	1.22
144.7	1.41
150.7	1.30
156.7	1.41
162.8	1.67
168.8	1.48
174.8	1.44
180.9	1.70
186.9	1.74
192.9	1.59
198.9	1.59
205.0	1.67
211.0	1.52
217.0	1.67

* ¼ charge alkali and soap added.

TRIAL IV

Cumulative Weight (gm.)	Residual Grease Content—%
5.9	0.33
11.8	0.33
17.7	0.49
23.7	0.45
29.6	0.68
35.5	0.86
41.5	0.83
47.4	0.90
53.3	1.02
59.3	1.20
65.2	0.60*
71.1	0.79
77.0	0.83
83.0	0.79
88.9	0.83
94.8	1.02
100.8	1.02
106.7	1.13
112.6	1.35
118.6	1.24
124.5	0.71*
130.4	0.83
136.3	0.68
142.3	0.98
148.2	0.87
154.1	0.94
160.1	0.94
166.0	1.05
171.9	1.02
177.9	1.17
183.8	1.20
189.7	0.94
195.6	1.24
201.6	1.17
207.5	1.17
213.4	1.13

* ¼ charge alkali and soap added.

TRIAL V

Cumulative Weight (gm.)	Residual Grease Content—%
5.1	0.35
10.2	0.35
15.3	0.39
20.4	0.44
25.6	0.48
30.7	0.48
25.8	0.65
40.9	0.70
46.0	0.74
51.2	0.96
56.3	1.14
61.4	1.22
66.5	0.70*
71.6	0.61
76.8	0.70
81.9	0.65
87.0	0.61
92.1	0.79
97.2	0.92
102.4	0.96
107.5	1.18
112.6	1.05
117.7	1.05
122.8	0.52*
128.4	0.76
133.9	0.64
139.5	0.89
145.0	0.97
150.5	0.89
156.1	1.05
161.6	1.05
167.2	1.09
172.7	1.21
178.2	1.29
183.8	1.17
189.3	1.25
194.9	1.05
200.4	1.45
205.9	1.45
211.5	1.21
217.0	1.13
222.6	1.41
228.1	1.45
233.6	1.33
239.2	1.49
244.7	1.49
250.3	1.33
255.8	1.53
261.3	1.44
266.9	1.61
272.4	1.70
278.0	1.49
283.5	1.49
289.0	1.65
294.6	1.86
300.1	1.78
305.7	1.65
311.2	1.57
316.7	1.57
322.3	1.61

* ¼ charge alkali and soap added.

TRIAL VI

Cumulative Weight (gm.)	Residual Grease Content—%
5.8	0.23
11.6	0.23
17.4	0.35
23.2	0.27
29.0	0.27
34.8	0.27
40.6	0.31
46.4	0.35
52.2	0.38
58.0	0.42
63.8	0.42
69.6	0.61
75.4	0.65
81.2*	0.42
87.0	0.42
92.8	0.54
98.6	0.61
104.4	0.65
110.2	0.65
116.0	0.69
121.8	0.69
127.6	0.73
133.4	0.77
139.2	0.77
145.0	0.77
150.8	0.73
156.6*	0.58
162.4	0.54
168.2	0.50
174.0	0.50
179.8	0.58
185.6	0.58
191.4	0.61
197.2	0.61
203.0	0.65
208.8	0.84
214.6	0.83
220.4	0.81
226.2	1.04
232.0	0.96
237.8	0.81
243.6	0.92
249.4	0.81
254.8	0.70
260.2	0.83
265.5	0.74
271.0	0.91
276.4	0.99
281.8	1.16
287.2	1.08
292.6	1.08
298.0	1.08
303.4	1.16
308.8	1.12
314.2	1.24
319.6	0.91
325.0	1.20
330.4	1.03
335.8	1.28
341.2	1.16
346.6	1.36
352.0	1.28
357.4	1.32
362.8	1.20
368.2	1.20
373.6	1.45

* ¼ charge alkali and soap added.

Cumulative Weight (gm.)
5.4
10.8
16.2
21.6
27.0
32.4
37.8
43.2
48.6
54.0
59.4
64.8
70.2
75.6
81.0
86.4
91.8
97.2
102.6
108.0
113.4
118.8
124.2
129.6
135.0
140.4
145.8
151.2
156.6
162.0
167.4
172.8
178.2
183.6
189.0
194.4
199.8
205.2
210.6
216.0
221. 4
226.8
232.2
237.6
243.0
248.4
252.8
259.2
264.6
270.0
275.4
280.8
286.2
291.6
297.0
302.4
307.8
313.2
318.6
324.0
329.4
334.8
340.2
345.6
351.0
356.4
361.8
367.2
372.6
378.0
383.4
388.8
394.2
399.6
405.0
410.4
415.8
421.2

* ¼ charge
** Suint bow

though the concentrations were the same. This change is reflected by the scouring curves which intersects the 1.3% control limit at 60 grams or 2/3 the amount scoured in trials I and II.

Trials IV and V are the same as trial III except that quarter charge additions of alkali and soap were made after 60 and 120 grams of wool were scoured. It appears that the first quarter charge addition is about as effective as the initial full charge, and the second quarter charge is more effective than either the first quarter charge or the initial full charge. It can be seen that the residual grease content of the individual skeins tends to fluctuate but that the scouring curve through a series of consecutive determinations gives reproducible characteristic scouring curves. Better control of immersion time and mechanical agitation, mentioned earlier, should help smooth out the curves.

The curves for trials V, VI, and VII are grouped together to show the effects of doubling and tripling the soap content. At current prices for soap, soda ash, and sodium metasilicate, the cost per gallon of the detergent system used in trial VI is approximately 13% more than that of trial V. Trial VII solution costs about 25% more per gallon than trial V. However, trial VI scoured 355 grams of wool within the 1.3% control limit whereas trial V scoured only 200 grams of wool. Hence trial VI scoured approximately 60% more wool per dollar than trial V. Trial VII shows even better scouring efficiency than the other two on a cost per pound of wool scoured basis.

The initial charges of trial VIII and IX contained 1.8% soda ash, with 0.036% soap for trial VIII, and 0.072% soap for trial IX. Quarter charge additions were made as indicated on the chart. A similar effect of increasing scouring efficiency with increasing soap content is evident. A comparison of the soda ash—soap trials VIII and IX with the soda ash—sodium metasilicate—soap trials V and VI indicates that, at current prices and under the conditions of the test, the detergent systems of trials V and VI cost from 30 to 40% more than the detergent systems of trials VIII and IX. From the data of such curves and the cost figures for the various detergents used, the relative scouring costs can be readily calculated. Furthermore, it is a simple matter to estimate the price

TRIAL VII

Cumulative Weight (gm.)	Residual Grease Content—%
5.4	0.25
10.8	0.12
16.2	0.17
21.6	0.17
27.0	0.21
32.4	0.21
37.8	0.25
43.2	0.25
48.6	0.33
54.0	0.25
59.4	0.29
64.8	0.37
70.2	0.33
75.6	0.29
81.0	0.37
86.4	0.33
91.8	0.33
97.2	0.37
102.6	0.37
108.0	0.41
113.4	0.50
118.8	0.58
124.2	0.33*
129.6	0.37
135.0	0.37
140.4	0.46
145.8	0.41
151.2	0.46
156.6	0.50
162.0	0.54
167.4	0.41
172.8	0.46
178.2	0.46
183.6	0.50
189.0	0.54
194.4	0.58
199.8	0.54
205.2	0.46
210.6	0.62
216.0	0.46
221. 4	0.50
226.8	0.58
232.2	0.58
237.6	0.58
243.0	0.37*
248.4	0.33
252.8	0.33
259.2	0.41
264.6	0.41
270.0	0.46
275.4	0.50
280.8	0.33
286.2	0.41
291.6	0.50
297.0	0.46
302.4	0.41
307.8	0.95**
313.2	1.08
318.6	0.74
324.0	0.91
329.4	0.95
334.8	1.05
340.2	1.08
345.6	1.12
351.0	0.95
356.4	1.08
361.8	0.83
367.2	0.95
372.6	1.04
378.0	0.95
383.4	0.83
388.8	0.87
394.2	0.70
399.6	0.70
405.0	0.74
410.4	0.74
415.8	0.58
421.2	0.74

* ¼ charge alkali and soap added.
** Suint bowl dumped.

TRIAL VIII

Cumulative Weight (gm.)	Residual Grease Content—%
5.3	0.33
10.6	0.33
15.9	0.38
21.3	0.46
26.6	0.46
31.9	0.54
37.3	0.71
42.6	...
47.9	0.79
53.3	0.71
58.6	0.75
63.9	0.54*
69.2	0.67
74.6	0.67
79.9	0.79
85.2	0.84
90.6	0.88
95.9	1.00
101.2	0.84
106.6	0.84
111.9	0.84
117.2	0.84
122.5	0.54*
127.9	0.63
133.2	0.67
138.5	0.63
143.9	0.67
149.2	0.75
154.5	0.71
159.9	0.79
165.2	0.84
170.5	0.79
175.8	1.04
181.2	0.96
186.5	0.88
191.8	0.96
197.2	1.13
203.2	1.18
209.2	1.18
215.3	1.18
221.3	1.11
227.3	1.21
233.2	0.90
239.2	0.87
245.1	1.17
251.0	1.17
257.0	1.17
262.9	1.32
268.8	1.13
273.7	0.98
278.6	1.12
283.5	1.07
288.4	1.20
293.3	1.29
298.2	

* ¼ charge soap and alkali added

TRIAL IX

Cumulative Weight (gm.)	Residual Grease Content—%
5.3	0.21
10.7	0.25
16.1	0.33
21.4	0.25
26.8	0.33
32.2	0.37
37.5	0.42
42.9	0.33
48.3	0.37
53.7	0.29
59.0	0.37
64.4	0.42
69.8	0.42
75.0	0.39
80.2	0.39*
85.4	0.39
90.6	0.30
95.8	0.39
101.0	0.43
106.2	0.34
111.4	0.43
116.7	0.34
121.9	0.39
127.1	0.51
132.3	0.60
137.5	0.60
142.7	0.60
147.9	0.56
153.1	0.56
158.3	0.47*
163.5	0.43
168.8	0.39
174.0	0.47
179.2	0.51
184.4	0.43
189.6	0.56
194.8	0.60
200.0	0.47
205.2	0.56
210.4	0.51
215.6	0.51
220.9	0.64
226.1	0.60
231.3	0.60
236.5	0.73
241.7	0.64
246.9	0.60
252.1	0.73
257.3	0.60

* ¼ charge soap and alkali added

to which a given detergent must fall to compete with another detergent. However, no generalized statement can be made from a limited set of test conditions that under all conditions, or for all purposes, one system if better than another. By applying this method to a given scouring problem under given conditions a practical evaluation for that specific problem can be obtained.

The greater scouring efficiency of trial IX prompted a revision of the test method to shorten the scouring curves again and hence the time required to run the test. Therefore, in trials X and XI where the triple soap content (0.108% soap) was used with 1.8% soda ash, the volume of the initial charge was reduced by one-half to a total of 1000 ml. of alkali-soap solution for the initial charge. Trials X and XI are similar runs for the first 220 grams of wool scoured. At this point the procedure varied in that 0.888 gram of soap was substituted in trial XI for the regular quarter charge addition of soda ash and soap in trial X. The reproducibility of the test method is again evident for the first 220 grams scoured. The addition of 0.888 gram of soap equals the cost of the regular quarter charge. Scouring efficiency at first appears to be improved by the all soap addition. However, the end result is decreased efficiently, as shown by the greater slope of the curve which rises rapidly above the 1.3% residual grease control limit.

The second quarter charge addition in trial X appears more efficient than either the first or third quarter charge additions. By extending the curve and making more quarter charge additions, the optimum point for dumping the bowls and starting with fresh solution can be determined. It is at this point that the true cost per lb. of wool scoured relationship can be estimated for a detergent system. This has much more significance from the viewpoint of cost efficiency than, say, the residual grease content of the first skein scoured. However, short scouring curves obtained from preliminary test feelers of 6, 12, or 18 skeins are valuable as screening guides so that greater time and energy can be devoted to the more promising detergent systems.

VI. Scouring Control

Conductivity and pH measurements of the scouring liquors were taken before and after each addition charge and at the beginning and end of each trial. The pH of the type of alkali systems discussed fluctuated very little and gave no promise as a control signal. Although some correlation between conductivity readings and scouring efficiency was observed in individual trials, a number of inconsistencies were observed, and the effect of varying soap concentration was not reflected in the least by these measurements. It is believed that the conductivity read-

TRIAL X

Cumulative Weight (gm.)	Residual Grease Content—%
5.6	0.32
11.2	0.28
16.8	0.28
22.4	0.24
28.0	0.28
33.6	0.32
39.2	0.44
44.8	0.36
50.4	0.40
56.0	0.36
61.6	0.40
66.8	0.52
72.0	0.56
77.2	0.60
82.4	0.77
87.6	0.64
92.8	0.82
98.0	0.82
103.2	0.94
108.4	0.99
113.6	0.99
118.8	1.03
124.0	0.39*
129.2	0.47
134.4	0.60
139.6	0.64
144.8	0.73
150.0	0.73
155.2	0.69
160.4	0.86
165.6	0.82
170.8	0.86
176.0	0.94
181.2	0.90
186.4	0.90
191.6	0.99
196.8	1.16
202.0	1.07
207.2	1.37
212.4	1.12
217.6	1.16
222.8*	0.86
228.0	0.69
233.2	0.69
238.4	0.86
243.6	0.77
248.8	0.64
254.0	0.86
259.2	1.16
264.6****	.79
270.0	.83
275.4	.83
280.8	.83
286.2	.95
291.6	.95
297.0	.95
302.4	1.20
307.8	1.03
313.2	1.03
318.6	1.12
324.0*	0.59
329.4	0.66
334.8	0.74
340.2	0.83
345.6	0.74
351.0	0.70
356.4	0.74
361.8	0.97
367.2	0.83
372.6	0.79
378.0	0.95
383.4	0.59
388.8	1.03
394.2	1.12
399.6	1.28
504.0	1.24
410.4	1.08
415.8	1.28

* ¼ charge addition
**** Rinse bowl dumped.

TRIAL XI

Cumulative Weight (gm.)	Residual Grease Content—%
5.4	0.25
10.8	0.21
16.2	0.29
21.6	0.29
27.0	0.25
32.4	0.29
37.8	0.25
43.2	0.25
48.6	0.25
54.0	0.32
49.4	0.46
64.8	0.46
70.2	0.46
75.6	0.58
81.0	0.62
86.4	0.66
91.8	0.62
97.2	0.83
102.6	0.83
108.0	0.91
113.4	0.99
118.8	0.99
124.2	0.32*
129.6	0.49
135.0	0.49
140.4	0.54
145.8	0.58
151.2	0.62
156.6	0.62
162.0	0.74
167.4	0.75
172.8	0.83
178.2	0.91
183.6	0.91
189.0	0.91
194.4	0.91
199.8	0.91
205.2	1.03
210.6	1.12
216.0	1.28
221.4	1.23
226.8	0.41***
232.2	0.41
237.6	0.32
243.0	0.46
248.5	0.49
254.0	0.49
259.5	0.65
265.0	0.73
270.5	0.69
276.0	0.89
281.5	0.97
287.0	0.97
292.5	1.01
298.0	1.18
303.5	1.14
309.0	1.26
314.5	1.26
320.0	1.26
325.5	1.21
331.0	1.22
336.5	1.71
243.0	1.67
247.5	1.63
353.0	1.63
358.5	1.50

* ¼ charge addition
*** 0.888 grams soap added.

ings were not consistent with scouring efficiency because of erratic drift behavior caused by fresh soap solutions on the electrodes, and because the build up of various ions and dirt as the scouring liquors became older caused increased divergence between conductivity readings and scouring efficiency.

Analysis of scouring curves obtained in the manner described above provides a method of evaluating detergents and critical factors of control such as temperature, squeeze roll pressure, etc., e.g. the surprising effect noticed in trial VII where, after 300 grams of wool had been scoured, the dirty water in the first steeping bowl was dumped and fresh water added, resulting in decreased scouring efficiency. The slow build up of very small amounts of alkali from the rinse wringer liquor appears to aid scouring efficiency more than the build up of dirt decreases it. With small modifications, the apparatus described above could be used to study a system using continuous counter-flow of scouring liquors.

The scouring curves suggest that control of wool scouring processes may well be controlled by merely metering the additions of detergent on the basis of the weight of wool scoured. Laboratory scouring curves would merely serve as a guide for establishing the mill scouring curve. Once the scouring formula was established for a given wool blend, proper sampling and extraction for residual grease content should serve as control checks. The results of the grease extractions should suggest any slight modification required by new or different wool blends.

VII. Further Possibilities

The scouring curve method may readily lend itself to further investigation for correlating effects of residual grease and alkali with level dyeing, or for correlating the effects of textile auxiliaries on various factors in processing and finishing of textiles. Soap builders, water softeners, scourability of various spinning lubricants, and scourability of various wool blends may also yield to this method of evaluation. The results of subsequent investigations along these lines will be submitted from time to time.

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(3) J. W. Creely, "Solubilization in Textile Processing", American Dyestuff Reporter, Vol. 36, pp. 411-412, (July 28, 1947).

(4) Foster Dee Snell, "Surface Active Agents", Industrial & Engineering Chemistry, Vol. 35, pp. 107-117, (1943).

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(6) J. P. Sisley, "Studies on Detergent Power", American Dyestuff Reporter, Vol. 36, pp. 457-465, (August 25, 1947).

(7) J. B. Crowe, "Cooperative Studies on a Laboratory Method for Evaluating Synthetic Detergents", American Dyestuff Reporter, Vol. 32, pp. 237-241, (May 24, 1943).

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Bylaws NNE Section—

(Continued from Page P185)

Article XX. Duties of the Auditing Committee

Section A. This Committee shall be composed of three (3) senior members in good financial standing, not already elected officers, a Chairman, and two (2) members appointed by said Chairman.

Section B. This Committee shall examine the Treasurer's ledger and financial records and shall prepare and present their report at the Annual Sectional meeting.

Article XXI. Duties of Budget Committee

Section A. This shall be a Committee

of three (3), the Vice-Chairman as Chairman, the Treasurer, and the Secretary.

Section B. This Committee shall prepare and present its budget for the fiscal year to the Sectional Committee at its first meeting in the fiscal year.

Article XXII. General Items

Section A. When any officer's residence or employment causes him to become a non-resident of this section he shall then automatically resign his Sectional office.

Section B. Newly elected officers shall take office each year at the beginning of the fiscal year. The fiscal year begins on the first of the calendar year.

Section C. The first Sectional Committee meeting shall be held within the first thirty (30) days of the fiscal year.

Section D. The annual Sectional Meeting shall be the last meeting held in the fiscal year.

Section E. The Sectional Committee shall select the place for the regular Sectional Meetings.

Section F. Expenditures of $50, or more, when properly presented, must be approved by a majority of the Sectional Committee.

Section G. Any Senior Member in good standing may at any time propose additions or amendments to the Bylaws by submitting them in writing to the Sectional Secretary.

Section H. The Bylaws may be amended at any time, after approval by a quorum of the Sectional Committee in meeting, by a majority vote of the Section in regular meeting, provided thirty (30) days' notice of such amendments has been given by mail to the full membership of the Section.

Section I. There shall be held a minimum of five (5) regular technical Sectional Meetings each year. Special meetings may be called at any time by the Sectional Committee.

Section J. Every elected officer, at the end of his term in office, shall transfer without delay to his successor in office all books, papers, records, funds, and all other properties of the Section in his possession or under his control.

Section K. A Sectional Committee meeting may be called any time by the Sectional Chairman or a quorum of the elected Sectional officers. A quorum shall be one over a majority of the then elected Sectional officers.

Section L. To be eligible for the office of Sectional Chairman of the Northern New England Section a duly qualified Senior Member must have served at least one term as an elected Sectional Committee officer.

Section M. No member may hold the office of Sectional Chairman for more than two years.

Section N. The Section shall not allow any exhibits nor demonstrations at any Sectional Meeting by any person or company other than the accredited speaker or speakers, and in no manner shall allow nor permit any commercial exploitations at said meetings.

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Hosiery Dyeing—

(Concluded from Page P194)

Mr. Walters: We ran a series of tests at about every temperature and time cycle that we could possibly think of, and the results were all the same. But we did run a series of tests in dyeing temperatures, and the results were gratifying in regard to the appearance of the hose after they had lain around for 24 hours or so.

Mr. Stout: I think you would expect to find this, that the 15 denier mono-fil might take a longer time at the same temperature for the heat and moisture to become effective in getting the set of the nylon; so a 15 denier, though lighter in total denier, being in one filament may take a little longer or a little higher temperature for a complete set. If you are getting good setting, you should be able to dye at a temperature of 20 to 30 degrees below your preboard temperature without wrinkling.: Some hosiery mills experienced during this past summer, in the very humid weather, a condition of wrinkling, not immediately after final boarding, but the hosiery picked up moisture later, with elongation and puckering. That might have been part of the trouble.

Mr. Walters: I think in the experiments that we have run we have also found that preboarding at higher temperatures got not only wrinkles but excessive curling because of excess shrinkage at the preboarding temperatures.

Chairman Siegrist: Doesn't it make sense to say this, that you can't tackle any one of these problems without considering a number of factors? For example, we all know that you get more shrinkage at high temperatures; you get it faster, it is more complete unless you stretch out your time cycle on a low temperature. Consequently, not only that temperature, but how you knit, the shape of your board, all affect your final result. If you are going to get the maximum shrinkage and take everything out that you can, you are doing a different job than you would do if you were to take only part of it. In the final results—I mean, as a wearer is concerned—boarding shapes and size over all areas must enter into the considerations.

Mr. Barquist: If you were dyeing a nylon wool mixture, and you had cotton present, and you used magnesium sulfate in place of acetic acid, wouldn't you get a similar result?

Chairman Siegrist: You would, but there again the choice of direct colors for nylon has a big bearing. One of your own favorites, ROA, which dyes almost anything, does a pretty good job dyed neutral on nylon, and when you distinguish between neutral Epsom salts, and acetic with a color like that, you don't see very much difference; they are all about alike. However, I would not choose that type of dyestuff for my cotton in such a combination; I would choose one that his the cotton hard and the silk or nylon very little. We are talking about dyestuff selection here and we have made no reference to fastness or anything else. That is an individual problem. What we are trying to do is show first of all the effect of Epsom, and we take it for granted that you wouldn't use a color that would give you bad results on your nylon portion, speaking of direct colors.

Mr. Walters: In the selection of acid colors, would those acid colors be those qualified more or less on nylon and silk combinations, more or less on the same stockings where you wanted to control the union properties?

Chairman Siegrist: I would rather not give you an answer on that, because nylon and silk unions are a tricky combination of fibers. Bear in mind that no dyestuff that we have shown here is recommended as being either good or bad. What we are trying to show is a method of selection, and when you choose your own, you have a very much greater range than this to choose from.

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Snag Resistance—

(Continued from Page P201)

never will be used for any of the tests. But the portion here for running the test doesn't come under the bevel board until after it has been used.

Mr. Olson: When you pull a stocking on one side, and the stocking is finished, you are putting strain on your finish, aren't you? Now do you take it and turn it over and pull it on the other side?

Dr. Smith: We run both sides and take an average.

Mr. Olson: When you run it on the other side you are naturally not going to have as much resistance to friction, because you have broken your finish when you pulled it across on the other side.

Dr. Smith: You speak of breaking the finish there, but I don't see why, off-hand. It depends, of course, on the type of finish you have. Most of these finishes do not give any binding of the stitch and actually the stocking probably wouldn't be worn if they did. As judged under the microscope, those threads are perfectly free to move.

Mr. Olson: Have you found that after you have pulled it on one side, and then turned it over and pulled it on the other side, you got different results?

Dr. Smith: There is often a variation between one side and the other, but not consistently favoring one side.

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Meeting, Western New England Section

A MEETING of the Western New England Section will be held at 7:00 P.M. at Rapp's Restaurant, Shelton, Connecticut.

Dr. Milton Harris, President of Harris Research Laboratories, will be the speaker and he will discuss "Functional Fiber Properties."

Election of officers will be held at this meeting.

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Programs, LTI Student Chapter

ON February 24th, Dr. David X. Klein, Director of Research of the Aspinook Corporation spoke before the Student Chapter of Lowell Textile Institute on the subject of "Rayon and Cotton Finishing".

Future programs include:

March 30th: Dr. Wakeman, Onyx Oil & Chemical Corp., "Surface Active Agents". The general public, faculty and entire student body has been invited to attend this meeting.

April 6th: Chapter meeting.

April 16th: Joint meeting with the Northern New England Section in Southwick Hall at the Institute.

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Meeting, Rhode Island Section

THE January meeting of the Rhode Island Section was held in the Providence Engineering Society Hall on Friday, January 30th, with approximately 125 present.

A short business meeting was held prior to the speaking program. The following three committees were created with chairmen as listed below:

Reception Committee—Robert P. Wood, *Chairman.*

Publicity Committee—Kenneth J. Broden, *Chairman.*

By-Laws Committee—George Wood, *Chairman.*

The members also voted to hold the Annual Outing and to sponsor the 1950 National Convention of the AATCC.

Gordon Hazelwood, New England Manager, Nylon Division of E. I. DuPont de Nemours & Co., Inc., was the first speaker. His subject was "Nylon—It's Properties and Applications".

Harry Clapham, Director, Technical Service Laboratory of DuPont was the second speaker. His subject was "Nylon Dyeing". A question and answer period followed.

Respectfully submitted,
E. A. Richards, *Secretary.*

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Meeting, Philadelphia Section

A MEETING of the Philadelphia Section was held on February 27th at Kugler's Restaurant in Philadelphia.

The dinner prize was won by Henry J. Menger of the Holland Laundry Co. The prize was awarded by Wm. J. Cramer, Jr. of the Celanese Corp. who flew to the meeting in his plane from Cumberland, Md.

The membership committee under W. O. Neeb of the Geigy Co. reported 22 new members since the last meeting.

Philip Sadtler of Samuel P. Sadtler & Son spoke on "Textile Analysis by Infrared Technique" which introduced a new tool for textile analysis and research.

A question period followed under M. H. Klein, Chairman of the Program Committee. A prize awarded for these questions was won by James H. Kettering, Naval Research Laboratory, Navy Dept., Washington, D. C.

165 members and guests attended the dinner preceding the technical session which attracted 198.

Respectfully submitted,
Thomas H. Hart, *Secretary.*

Notice to Secretaries of Local Sections

All reports and papers should be sent to the National Secretary.

CALENDAR

PHILADELPHIA SECTION
Meetings: April 9, May 14 (Kugler's, Philadelphia); Outing: June 11 (Atlantic City Country Club, Northfield, N. J.).

NEW YORK SECTION
Meeting: May 7 (Swiss Chalet, Rochelle Park, N. J.); Outing: June 25 (North Jersey Country Club).

PIEDMONT SECTION
Meetings: Apr. 3 (Robt. E. Lee Hotel, Winston-Salem, N. C.); June 18 (Ocean Forest Hotel, Myrtle Beach, S. C.).

NORTHERN NEW ENGLAND SECTION
Meetings: April 16 (Lowell Textile Institute); May 21, June 11 (Outing); September 24 (Andover Country Club); November 19.

SOUTHEASTERN SECTION
Meetings: July 24 (Atlanta, Ga.); September 25 (Columbus, Ga.); December 4 (Atlanta, Ga.).

SOUTH CENTRAL SECTION
Meeting: April 10 (Patten Hotel, Chattanooga).

LTI STUDENT CHAPTER
Meetings: March 30, April 6, April 16.

WESTERN NEW ENGLAND SECTION
Meeting: April 2 (Rapp Restaurant, Shelton, Conn.)

SUB-COMMITTEES
Meeting: April 1 (Hotel Pennsylvania, New York).

COUNCIL
Meeting: April 2 (Hotel Pennsylvania, New York).

RESEARCH COMMITTEE
Meeting: April 2 (Hotel Pennsylvania, New York).

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

48-1

Education: B.S., Rhode Island State College.
Experience: Chemist, print works.
Age 33; married; references; position in New England desired.

48-2

Education: B.S., R. I. State College.
Experience: General chemical and testing; laboratory and plant development of methods for applying dyes and textile specialties.
Age 37; married; references.

48-3

Education: B.S., with graduate work; fair knowledge of languages.
Experience: Textile chemical research, cotton dyeing, printing and finishing.
Age 26; woman, unmarried; references; vicinity of New York or Philadelphia preferred.

TRADE NOTES • NEW PRODUCTS

• Joins High Point Chemical

Robert H. Smith, for 17 years Superintendent of Dyeing for the Melrose Hosiery Mills of High Point, N. C., who has joined the High Point Chemical Manufacturing Company as technical demonstrator and salesman. Mr. Smith is a graduate of N. C. State College, and was formerly connected with the National Aniline Division of Allied Chemical Corp., and Durham Hosiery Mills of Durham, N. C. He is Secretary of the Piedmont Section of AATCC. He has also been active in the various Masonic and Shrine Bodies and the Lions International of North Carolina District 31.

• Annual Meeting, AIC

The date of the Annual Meeting of The American Institute of Chemists has been changed from May 8th to Friday, May 7th. The change was made to enable the New York Section of the American Chemical Society to meet jointly at the Institute's Silver Anniversary dinner at the Waldorf-Astoria Hotel, New York City. At that time, the Institute will present its gold medal to Dr. Charles Allen Thomas, president of the American Chemical Society. Dr. Thomas is executive vice president and technical director of Monsanto Chemical Company, St. Louis. He will combine his acceptance speech with his previously scheduled address before the American Chemical Society group on May 7th.

• New Bedford Textile Institute Golden Jubilee

R. C. Dick, President and Treasurer of Naumkeag Steam Cotton Mills has been elected General Chairman of the NBTI Golden Jubilee Celebration Committee.

Mr. Dick announces an active three day program, May 13th, 14th and 15th, 1948. The School has had over twenty thousand in attendance and over five thousand graduates, and those planning to be at the Celebration should make hotel reservations direct to the New Bedford Hotel. The program follows:

Thursday, May 13

12 Noon—4 P.M. Registration at Institute.

1 P.M.—4 P.M. Open House at Institute (conducted tours).

4 P.M.—12 M. Class Gatherings and Reunions at N. B. Hotel.

Friday, May 14

9 A.M.—4 P.M. Registration at Institute.

4 P.M.—7 P.M. Registration at New Bedford Hotel.

10 A.M. Golf Tournament at N. B. Country Club.

9 A. M.—4 P. M. Conducted tours through the Instittue.

2 P.M. Baseball Game—Textile vs. Brown University.

7 P.M.—9 P.M. Golden Jubilee Banquet.

Speakers:

Russell Fisher, President of the National Association of Cotton Manufacturers.

John Desmond, Commissioner of Education for the Commonwealth of Massachusetts.

Harold Sturtevant, Historian, Vice Pres. of the New Bedford Textile Alumni.

John Grady, Toastmaster.

10 P.M.—1 A.M. Golden Jubilee Ball.

Saturday, May 15

9 A.M.—11 A.M. Reunion of All Classes at Institute.

11 A.M. Alumni Business Meeting.

2 P.M.—5 P.M. Golden Jubilee Clambake at Dan's Pavilion (Awarding of Prizes).

5 P.M. "As You Like It."

• Sted Prices Reduced

A reduction in prices for Sted, synthetic detergent for textile scouring, washing and cleaning, was announced recently by Monsanto Chemical Company at its Merrimac division headquarters in Everett, Mass. Sted is the new name for the product formerly known as Lucenol, which is said to have gained wide acceptance in the textile industry.

• Sandoz Chemical Appointment

The Sandoz Chemical Works has appointed Walker C. McBeath as demonstrator for textile chemicals in the Boston office. Mr. McBeath was on the staff of the Philadelphia Quartermaster Depot, in the Research and Development Department for Dyeing and Finishing, during the war years. He also served 3½ years in the U. S. Army. He had several years experience in the American Printing Company, Fall River, Mass., prior to his war service.

Increased use and production of Monsanto's synthetic detergent and scouring agent have made possible the reduction, according to a statement by Dr. D. H. Powers, Director of Monsanto's textile chemicals department.

Sted is primarily a detergent, he stated, developed to give scouring and cleaning power. It is not another wetting agent with some soil-removal action.

• To Give Course on Textiles

Dr. Joseph B. Quig, assistant manager of the development section of the Du Pont Company's Rayon Technical Division, has been appointed instructor for a new course on textiles which was initiated by the University of Delaware on February 9.

The course, one of those in the university's academic extension plan, will cover the basic properties of natural and synthetic fibers and the production, economic, technological, and chemical phases of all fibers and fabrics. Exhibits, motion pictures, and plant trips will augment the evening lectures. Dr. Quig has a broad knowledge of the textile industry, and is

• Opens Consulting Office

J. J. Press, who has resigned as Vice President and Director of Textile Research for the Manufacturers' Research Laboratories, Inc., and is now located at 150 Riverside Drive, New York City, as consultant to the textile and chemical industries. He was previously in charge of research on textiles, proteins, and synthetic fibers at the Ford Motor Company and assistant research director at the research laboratory of the Virginia-Carolina Chemical Corporation. He has had many years experience in the manufacture and use of industrial proteins, synthetic fibers, textile specialties, textiles and resins.

an experienced teacher.

After World War II, Dr. Quig was appointed to the "textile team" which was formed by the Foreign Economic Administration to investigate the industry in Germany, Austria, and Italy.

Dr. Quig, who will add his teaching to his Du Pont duties, is a member of the American Chemical Society, American Association of Textile Technologists, Chemical Corps, American Association of Textile Chemists and Colorists, and the Institute of Textile Research. He has recently been named chairman of the board of directors of The Textile Research Institute at Princeton, N. J.

E. F. Altmaier of the Rayon Division and Carl I. Taber of the Nylon Division will assist Dr. Quig.

• Pacific Mills Broadcast Period

As a contribution to the general interests of Greater Lawrence, Massachusetts, which has a population of approximately 200,000 residents, Pacific Mills has signed a year's contract with Radio Station WLAW, 50,000 watt affiliate of the American Broadcasting Company, which will provide a quarter hour broadcasting time weekly for use by civic, social and fraternal organizations and groups in the promotion of projects for the benefit of the four communities in the area. The series of broadcasts will be heard every Thursday at 7:15 P.M. Plans call for the presentations of discussions of timely topics, music, interviews and other types of programs which will tend to outline and promote the activities of the participating groups as they benefit their communities and their people as a whole.

• Dexter Chemical Booklet

The paper, "Old Dyers, Old Books, and Old Methods", which was published in our issue of September 22, 1947, is the subject of a recent booklet by Sidney M. Edelstein of the Dexter Chemical Corporation.

Mr. Edelstein, who is technical director of the textile chemical division for Dexter, discussed the subject matter in detail at a combined meeting of the Lowell Textile Institute Student Chapter and the Northern New England Section of the AATCC in the Institute at Lowell, Mass.

Business men interested in receiving a copy of "Old Dyers, Old Books, and Old Methods", should write on their company letterhead to the Dexter Chemical Corp., 819 Edgewater Road, Bronx 59, N. Y.

• Selling Agent for Boconize

Appointment of Rohm and Haas Company of Philadelphia as selling agent for Boconize, a durable new mothproofing compound for use in the textile industry, was announced recently by Ernest J. Conway, President of Bocon Chemical Corp. Rohm and Haas will handle sales of Boconize to textile mills in all the United States except New York and New England. That territory is being handled by the Perkins Soap Company, Springfield, Mass.

• New Bancroft Developments

It has been announced by W. Ralph MacIntyre, President of Joseph Bancroft & Sons Co. of Wilmington, that completion of agreements insures the distribution throughout the world of textile developments originated by the Bancroft mills. Mr. MacIntyre disclosed that the latest growth of international operations by Bancroft followed agreements made with Calico Printers Association, Ltd., of Manchester, England, and with the Raduner Company, A.G., of Horn, Switzerland. Through these agreements with the Bancroft Company, in addition to "Everglaze" chintzes, other patented "Everglaze" fabrics will be made available for production overseas and in North and South America.

A new department, created in the company for these operations, is called "Everglaze" International. This department will conduct a comprehensive planned program, both in this country and abroad, on the promotion of "Everglaze" fabrics and chintzes.

Two new fabric developments revealed by the Bancroft Company are: durable lustrous effects for spun rayon and mix-

• Retires from Ciba

After many years of service, Frederick C. Wittig, manager of the Boston office of Ciba Company, Inc., retired on January 29, 1948. Mr. Wittig entered the dyestuff business as a young man and has witnessed and been a part of its growth in this country from its earliest days up to the present time.

He entered the employ of the Geisenheimer Company in April, 1905, came to Boston in 1906 and became Boston Manager of the company in 1910. The Geisenheimer Company subsequently became Aniline Dyes and Chemicals, Inc. which in turn was absorbed by the Ciba Company, Inc., in 1921. From February 1921 up to the time of his retirement Mr. Wittig served as Boston Manager and as a Director of the Ciba Company, Inc. of New York.

Mr. Wittig was born in New Brunswick, New Jersey, January 29, 1883 and educated in the public schools of that city. He then entered Rutgers University, and was graduated in the class of 1904. He is a member of Masons, AATCC, Drysalters Club of Boston and the Weston Golf Club.

• Sandoz Technical Adviser

H. L. Schwarz, who for many years has been connected with Sandoz Chemical Works, Inc., is now available as a technical adviser to the dyeing and bleaching trade in metropolitan New York and Paterson. Mr. Schwarz is a graduate of Lowell Textile Institute, Class of 1922, and since that time has been connected with the dyestuff industry or in the textile trade itself. He is well versed in all phases of the dyeing and finishing cottons, and synthetics.

tures of rayon and cotton; and, durable subdued and deepseated luster cottons and rayons. The first group of fabrics, resulting from research in Bancroft laboratories and now ready for full commercial use, are said to feel and look like linen. The second group of fabrics are said to possess a soft, flexible hand with unusual draping qualities. It is stated that the fabrics, which are free from excessive creasing and shrinking, will be available in plain shades and prints.

Both the rayons and cottons, it is claimed, do not fray out and retain their durable degree of luster, crease resistance and other qualities through repeated dry cleanings and washings.

Commenting on these new fabric developments, Dr. D. H. Powers, Director of the Textile Chemicals Department of Monsanto Chemical Company said:

"The new effects and the new fabrics which now can be included in the "Everglaze" family give further evidence of the versatility of Resloom melamine resins in textile finishing.

"With Resloom, Bancroft's finishing experts have now been able to produce durable glazed effects on spun rayon and mixtures as well as cotton, to achieve subtle "deep-seated" luster as well as glossy effects on both cotton and rayon, and to obtain a soft as well as a crisp hand. In addition, the fabrics receive the benefits of stabilization and wrinkle resistance which Resloom imparts.

"These durable effects not only increase the number of "Everglaze" fabrics but greatly increase the uses to which these fabrics can be put."

W. Ralph MacIntyre

• Lectures at Calco

Dr. Arthur C. Cope, Head of the Department of Chemistry at the Massachusetts Institute of Technology, recently lectured on the subject of "Allylic Rearrangements", at the Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J. This field constitutes his best known contribution to organic chemistry. He began this work at Bryn Mawr in 1938 and continued it at Columbia and MIT. His first co-worker in this field, Dr. Elizabeth Hardy, is now a member of the Research Department of the Calco organization.

In his lecture, Dr. Cope outlined his remarkably complete coverage of this field from the rearrangement of the allylic group in highly active three-carbon systems, which occurs readily and completely under mild conditions, to the rearrangement of completely unactivated systems such as straight chain aliphatic olefins, where it occurs only as an equilibrium reaction at very high temperatures.

• Calco Appointment

John Rhodes, who has been appointed as a sales representative in the Philadelphia territory, according to an announcement by J. Pfister, Manager, Dyestuff Department, Calco Chemical Division, American Cyanamid Company.

Mr. Rhodes is a native of Philadelphia and obtained his early education in the Philadelphia Public School and Brown Preparatory School. He attended Philadelphia Textile Institute and Rutgers University. He saw two years' service with the Tank Destroyer Command and the U. S. Field Artillery.

Mr. Rhodes brings to his new position a background of experience gained in actual work in dyehouses and in the application laboratories of the Calco organization.

Lecture at Calco—Left to right—Dr. R. S. Long, Calco, Assistant Director of the Organic Section of the Research Department; Dr. A. C. Cope, Head of Department of Chemistry, MIT; Dr. M. Scalera, Calco, Assistant Director of the Organic Section of the Research Department; Dr. H. Z. Lecher, Calco, Associate Research Director.

• Color Blindness Test

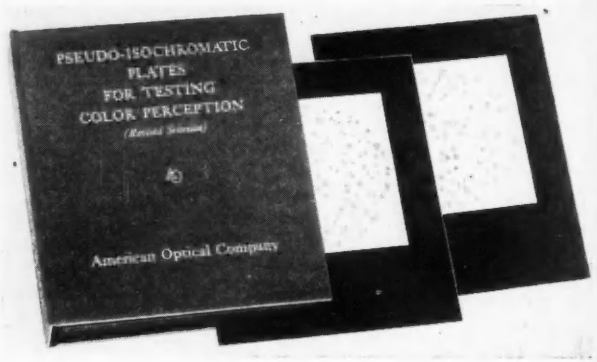
An abridged edition of its "Pseudo-Isochromatic Plates for Testing Color Perception," approved by the Inter-Society Color Council, is announced by American Optical Company, Southbridge, Mass.

Designed to detect those individuals lacking good color vision needed in the performance of their duties, the new edition contains 18 approved plates and instructions for performing the test so that the best possible results are obtained. The plates, printed on conventional book-size pages, are attractively bound in a heavy spiral binder.

Included is a demonstration plate for use by the examiner in explaining to the subject how the test is made. The results obtained are said to be easily tabulated and the subject's error score readily determined. This score indicates whether the subject is normal or defective as regards red-green color discrimination.

The 18 charts are composed of figures whose contours are made up of variously shaded dots of the primary colors set on a differently colored background containing similar dots in colors that the red-green color-blind person tends to confuse. The tints were selected by the aid of a color-blind painter so as to correspond to the confusion colors of a color-blind individual.

The figures, composed of the primary colors, are readily seen by a normal person, while the color-blind individual, unable to detect the differences in color, cannot distinguish the contours of the figures from the background or, in mild degrees of color blindness, shows some hesitancy in naming them.



Abridged edition of American Optical Company's plates for testing color perception. Two of the plates are shown.

• Anti-Static Agent

American Cyanamid Company has announced that the Textile Resin Department's product, "Aerotex" Softener H, is an effective and inexpensive anti-static agent for use on fabrics where nylon or "Vinyon" yarn, type N, predominates. It is stated that the use of "Aerotex" Softener H on these types of fibers will largely eliminate development of static in mill operation. The product was originally developed to impart unusual softness to fabrics.

• Western Division Office, Nuodex

The Western Division office of Nuodex Products Company, Inc., has moved to new and larger quarters at 505 North La Salle Street, Chicago, according to John W. Van Tuin, Sales Manager of the Division. Operating out of the Western Division office, in addition to Mr. Van Tuin, are George H. Moyer, Regional Sales Manager for the North Central Region, and Robert A. Peterson, Sales Representative for the Chicago district.

• Monsanto Office, Portland, Ore.

Monsanto Chemical Company announced recently the establishment of a sales office in Portland, Ore., to handle all Monsanto products.

The office will be located at 421 Southwest Sixth Avenue. It will be staffed by Baxter Pearson, representing chemical and plastic sales, and W. W. Hayes, in charge of coating and adhesive sales.

• Joins American Organic

Dr. Charles Kaitz has joined the Staff of the American Organic Chemical Corporation, 1300 Allen Street, Linden, N. J., as announced recently by Stanford L. Hermann, President. Prior to coming to this organization, he had been Secretary-Treasurer of the Chemical Synthesis Company of Vineland, New Jersey and was also previously with the American Dietaids of Yonkers, New York as well as the Calco Chemical Division of American Cyanamid Company.

• Open Enlarged Laboratories

Samuel P. Sadtler & Son, Inc., opened its enlarged laboratories at 2100 Arch Street, Philadelphia 3, on February 16.

The laboratories have long been known for their general consulting, research, and referee analytical chemistry. The addition of new services has necessitated this change.

Some of the new services are: organic, inorganic micro chemical laboratories, biochemical and bacteriological laboratories, and an absorption spectral laboratory for ultraviolet, visual, and infrared measurements.

• Chairman, ISCC

Dr. I. H. Godlove, of General Aniline & Film Corporation, was recently elected National Chairman of the Inter-Society Color Council. He will continue as Editor-in-Chief of the council publications, a position he has held for many years.

Dr. Godlove has long been one of this country's leaders in the field of color research and besides his work on the Color Council, he is a trustee of the Munsell Color Foundation, a member of the Color Committee of the AATCC and of the colorimentry sub-committee of the Optical Society.

OBITUARY

DONALD B. OSBORNE

Donald Brown Osborne, 60, vice-president and manager of the Broad River Processing Co. in Asheville, N. C., and one of the most outstanding sulfur dyers in the United States, died in an Asheville hospital January 26th following a short illness.

Mr. Osborne, a native of Michigan and a resident of Asheville for two and one-half years, devoted most of his life to the textile industry. Prior to joining Broad River he was secretary of the Sumter Textile Mills at Sumter, S. C. where he was located for 21 years. Before that he was manager of the American Textile Dye Works in Milwaukee, Wisconsin with which company he was associated for twelve years. He began his career as an apprentice with the Clinton Woolen Mills, Clinton, Michigan.

Mr. Osborne was a member of the American Association of Textile Chemists and Colorists.

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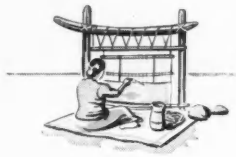

CALCO *dyelines*

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NOW AVAILABLE—A VAT GREY OF EXCELLENT FASTNESS AND LEVELNESS

Until the advent of Calcosol† Grey 2G Double Paste and Calcoloid† Grey 2G Double Powder, the production of fast grey shades presented a difficult problem. Available vat dyes with adequate fastness properties were extremely difficult to dye levelly, especially on yarn in skein or package form. When, as was usually the case, a grey vat dye had to be shaded with other vat dyes, level dyeing difficulties were accentuated. Available vat dyes with good level dyeing properties lacked really excellent fastness properties.

Developed after intensive research, Calcosol Grey 2G Double Paste and Calcoloid Grey 2G Double Powder have attained wide commercial acceptance and increasing popularity. The achievement marks the first time that a vat grey has been made available which combines excellent fastness and excellent dyeing properties.

In package dyeing it will produce a range of light grey shades on thread yarn; and it will produce pale grey shades on fine cotton yarns for high-quality shirting fabrics which are scoured and bleached after weaving.

In the piece goods field, large yardages of appropriate fabrics, regularly dyed with Calcosol Grey 2G Double Paste or Calcoloid Grey 2G Double Powder, readily meet the severe fastness specifications for industrial uniform fabrics which go into waitresses' and nurses' uniforms, into men's work clothes and into outdoor sportswear.

On wool, vat-dyed with Grey 2G, outstanding fastness to light is obtained. For this reason it is recommended for use on automotive fabrics and other types of upholstery where satisfactory resistance to several hundred hours of sun exposure is important.

Recommended Shading Dyes

Suitable shading dyes for use with Calcosol Grey 2G Double Paste and Calcoloid Grey 2G Double Powder are:

Calcosol Copper Brown Paste and Calcoloid Copper Brown Double Powder
Calcosol Brown BR Paste and Calcoloid Brown BR Double Powder
Calcosol Brown R Paste and Calcoloid Brown R Double Paste
Calcosol Violet BN Extra Paste
Calcosol Red BN Double Paste

†Trade-mark

CHECK LIST FOR THE PACKAGE DYER

The package dyer, dyeing vat shades economically on cotton yarn to meet current demands for a complete range of shades with good fastness properties, would need the following dyes in his drug room:

*Calcoloid Grey 2G Double Powder
Calcosol Navy Blue Paste
*Calcoloid Blue BLD Double Powder
*Calcoloid Dark Blue BOD Double Powder
*Calcoloid Copper Brown Double Powder
Calcosol Brown BR Paste
*Calcoloid Brown R Double Powder
*Calcoloid Brown G Double Powder
*Calcoloid Olive R Double Powder
Calcosol Olive Green BN Double Paste
Calcosol Jade Green N Supra Double Paste
*Calcoloid Golden Orange GD Double Powder
*Calcoloid Golden Orange RRTD Double Powder
*Calcoloid Pink FFD Double Powder
Calcosol Red BN Double Paste
*Calcoloid Yellow GCD Double Powder

*Paste type available also

Check your stock. Most of these dyes can be applied by either the pigment method or the reduced method. For specific information, consult your Calco representative.

The above dyes are also applicable to cotton in various other stages of manufacture, such as warps, raw stock and piece goods. By using them for various types of applications, drug room inventory can be better controlled.

THE DYE CLINIC

If shaded dyeings appear on piece goods at the padder, here are some of the possible causes:

Uneven set on padders.
Pad rolls worn to a smaller diameter in the central portion or where fabric selvedges usually run.
Pad rolls of uneven density, due to improper curing during their manufacture.

Non-uniform flow of dye over the cloth entering the nip.
Guide rolls shifted out of parallel with other rolls.
Guide rolls stuck in bearings and dragging, or not revolving.
Expanders not contacting cloth with uniform pressure across the width.
Non-uniform moisture content of cloth entering the padder.
Settling of dye dispersions in supply tank or padder pan.
Uneven winding up of cloth on the take-up shell.
Non-uniform removal of impurities from cloth preparatory to dyeing.
Uneven height of singer flames.
Cloth not protected from foam when it enters bath.

"Yeah I know—you musta left your tickets at home!"

ACID ALIZARINE BLUE B — Pr. 93

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2. *Quality* of filter cloth.
3. *Use requirement* of cloth intended to resist or pass air.
4. *Water-resistant* properties.
5. *Coolness* or *warmth* of clothing material.
6. *Construction* of cloth.
7. *Penetration* into cloth of various coatings.
8. *Retention of fillers, starch and sizing* in cloth after laundering or cleaning.
9. *Compactness, nap* or *fiber arrangement* in cloth after fulling, washing, sizing or other treatments.
10. *Amount of wear* after abrasion tests.

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Based on an average of 5 lots per day, this represents a total production capacity of more than 125,000 pounds of yarn daily. And this tremendous investment has been a profitable one . . . for it is estimated that the increased earnings of these machines have paid off the investment within an average of one to two years!

Such earnings are the direct result of the radically new principle introduced by this Smith-Drum machine. It prevents snarling or tangling of yarn, reducing winding time and costs. It increases production as much as 50% because it permits larger batches than any other machine occupying the same floor space, and because faster dyeing makes possible more batches per day. Low liquor ratio, greater production and faster dyeing combine to reduce dyeing costs 25% to 30% . . . while quality of dyeing is greatly improved.

More details will be sent upon request.

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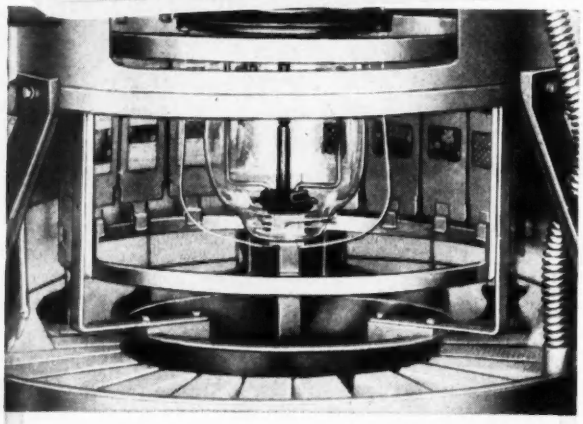
ATLAS FADE-OMETERS

Now have an improved method of specimen suspension assuring a more equal distribution of radiant energy for all samples.

Available for installation on all Model FDA and FDA-R Fade-Ometers now in use. . . .



A lower ring engaging the new modified specimen holders supports the specimens during exposure in such a way as to assure more equal distribution of energy for all samples.

Developed at the request of and in cooperation with the A.A.T.C.C. Committee on Fastness to Light the new holders and lower ring prevent discrepancies in test results caused by unequal distances from the specimen to the light source resulting from improper alignment of the holders.

This new method of suspension improves accuracy of test results since it materially reduces the possibility of deviation of the specimens from the vertical due to the human element or for mechanical reasons.

The lower ring can be installed on all Model FDA and FDA-R Fade-Ometers now in operation, adapting them for use with the new type specimen holders. In addition to the holders finished in baked-on gray enamel we now are also able to supply at slight additional cost the new modified specimen holders fabricated from a dull finish stainless steel.

Write for complete information on this new improved method of specimen suspension for your old machines.

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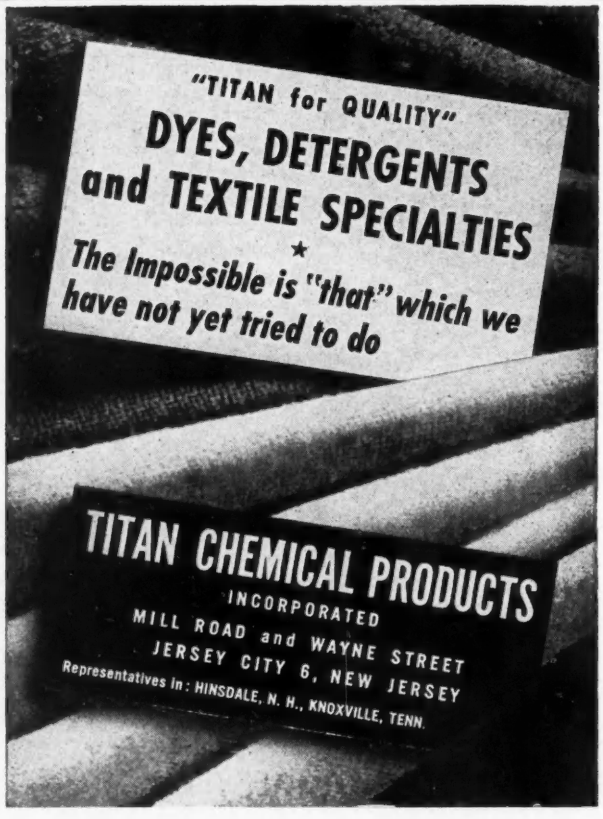
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March 22, 1948

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The Theory and Practice of Wool Dyeing

by C. L. BIRD, M.Sc., F.R.I.C.

Lecturer in Dyeing University of Leeds
Editor, Journal of the Society of Dyers and Colourists

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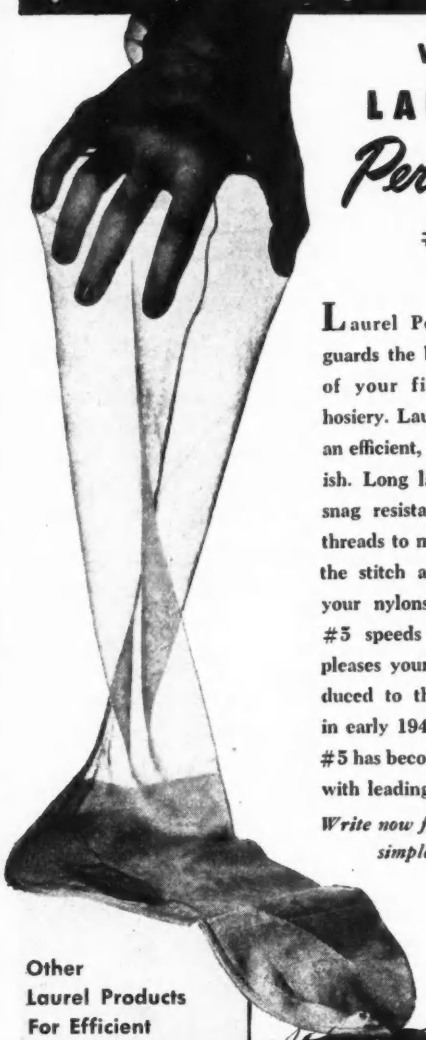

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Presenting the Ethomids!

The Ethomids are a group of chemicals made from the Armids (Armour's fatty amides) and, being non-ionic in character, are compatible with anionic, cationic and non-ionic surface active materials. The Ethomids tend to be more stable to hydrolysis than the Ethofats in medium concentrations of acids and bases. Indicated uses: as detergents, as emulsifying agents, as wetting agents, as waxes, as dispersing agents.

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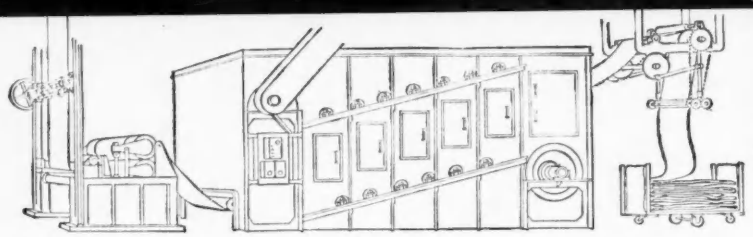

In the first section of the Butterworth Continuous Dyeing Range, goods enter a 2-roll padder in which the color is applied in pigment form, followed by drying on a special type air dryer.

Cut Dyeing Costs on Vats and Sulphurs

Get ready to sharpen your pencil and refigure your dyeing costs on vats and sulphurs. Here are facts about the Butterworth Continuous Dyeing Range based on actual mill installations.

Butterworth Pad Steam Range Vs. Jig Dyeing

1/3 Floor Space

Complete pad steam range requires space only 110 x 10 feet to run 6,000 yards per hour. To produce same yardage by jig method requires 3,250 sq. ft. of floor space for vat colors, 2,800 sq. ft. for sulphurs.

2/5 Labor Cost

Pad steam range requires crew of four men plus part-time color weigher and mixer—36 man hours on 8-hour shift. To produce same yardage on vat colors by jig method requires 100 man hours on 8-hour shift . . . 88 man hours on sulphurs.

Savings on Chemicals, Dyestuffs

Chemical costs are cut an average of 40% with the pad steam range. Color costs are equal, or up to 25% less on certain classes of goods. In addition you save the cost of jig leaders . . . get better output because there are no jig ends to trim back.

It takes only two pads, a hot flue dryer, a steamer and a compartment washer to give you a complete 2-stage range for both vat and sulphur colors. Compare this with 24 jigs required to produce an equivalent yardage on jig work . . . plus roll benches for storage and in the case of vat colors a pigment padder. For a comparison of pad steam vs. jig work, see figures at left.

If you are doing *conventional* continuous reduced or pigment work, consider these facts. The Butterworth pad steam range will cut your costs from 10% to 35% on both vat and sulphur colors. On vat colors you will get deep shades which formerly required the use of jigs. On sulphurs, pad steam dyeing gives full jig money value and fastness, and shading is controlled throughout the run.

For complete facts on Butterworth Continuous Dyeing Systems, write us today.

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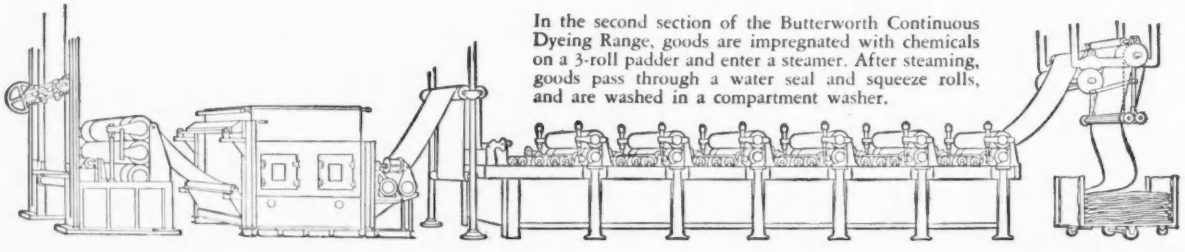

In the second section of the Butterworth Continuous Dyeing Range, goods are impregnated with chemicals on a 3-roll padder and enter a steamer. After steaming, goods pass through a water seal and squeeze rolls, and are washed in a compartment washer.

Let them decide

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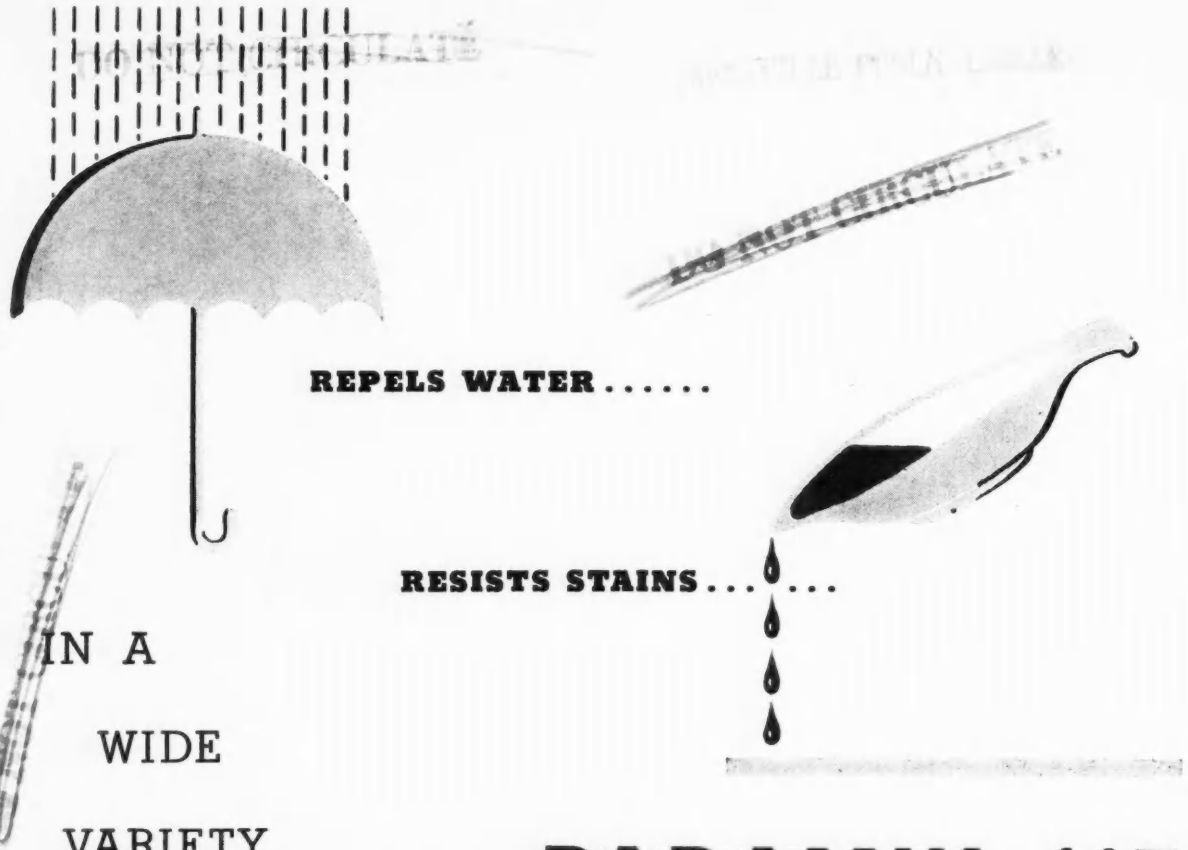

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